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Lu et al.

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(54) **METHOD FOR IMPROVING LUMINOUS INTENSITY ADAPTABILITY AND DEVICE THEREOF**

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H04B 10/564 (2013.01)
H04B 10/50 (2013.01)
G01J 1/44 (2006.01)

(52) **U.S. Cl.**
CPC ***H04B 10/564*** (2013.01); ***G01J 1/44*** (2013.01); ***H04B 10/501*** (2013.01)

(58) **Field of Classification Search**
CPC H04B 10/564; H04B 10/501; G01J 1/44
USPC 250/206
See application file for complete search history.

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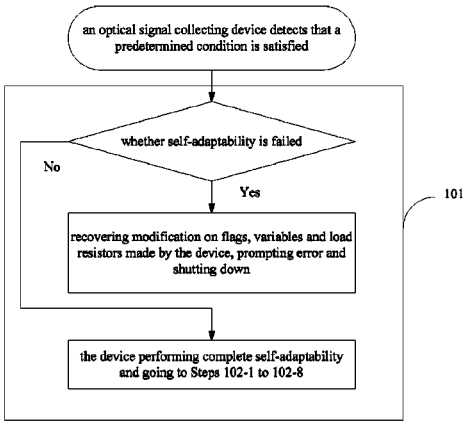
(57) **ABSTRACT**

The invention discloses a method for improving luminous intensity adaptability and a device thereof, relating to photoelectronic communication field. In the method, the device is configured with more than one level load resistors, the device collects voltage value and if the device collects predetermined numbers of voltage values which meet some requirement, it computes an average value of all collected voltage values, sets voltage value according to the average value, determines whether the set voltage is satisfied with a predetermined requirement, if yes, collects data according to the set voltage; otherwise, switches the load resistor according to a predetermined rule, in which the load voltage has influence on collecting voltage. The invention has advantages of improving luminous intensity adaptability of a screen when collecting optical signal and reducing rate of error codes.

7 Claims, 21 Drawing Sheets



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			JP	2010175572 A	8/2010

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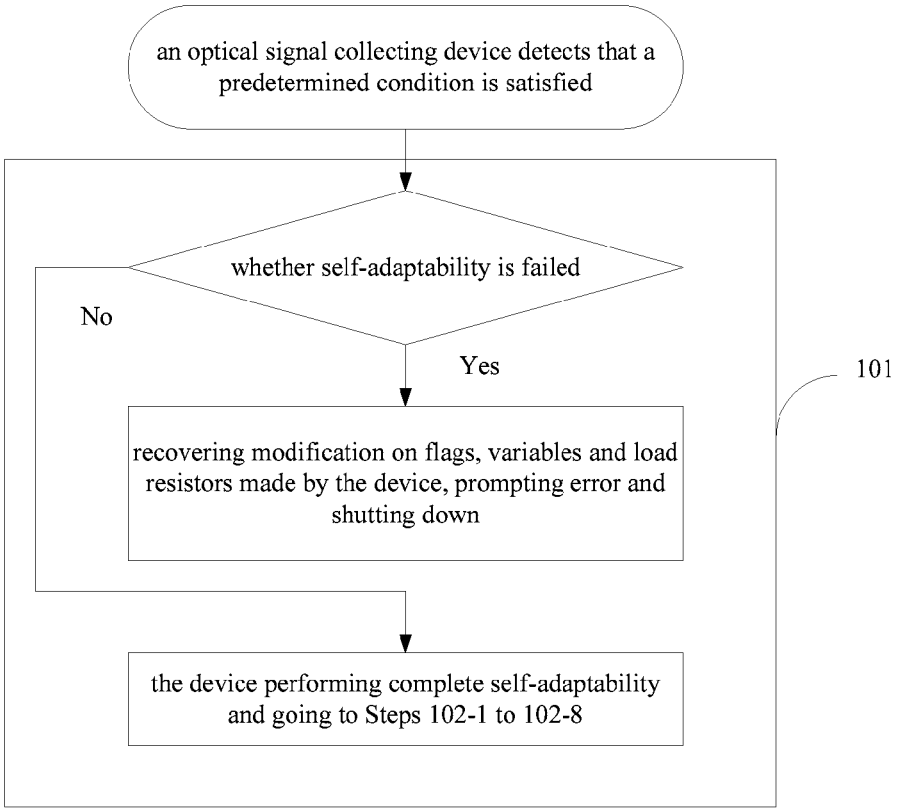
an optical signal collecting device detects that a predetermined condition is satisfied
whether self-adaptability is failed
No
Yes
recovering modification on flags, variables and load resistors made by the device, prompting error and shutting down
the device performing complete self-adaptability and going to Steps 102-1 to 102-8
101

FIG. 1

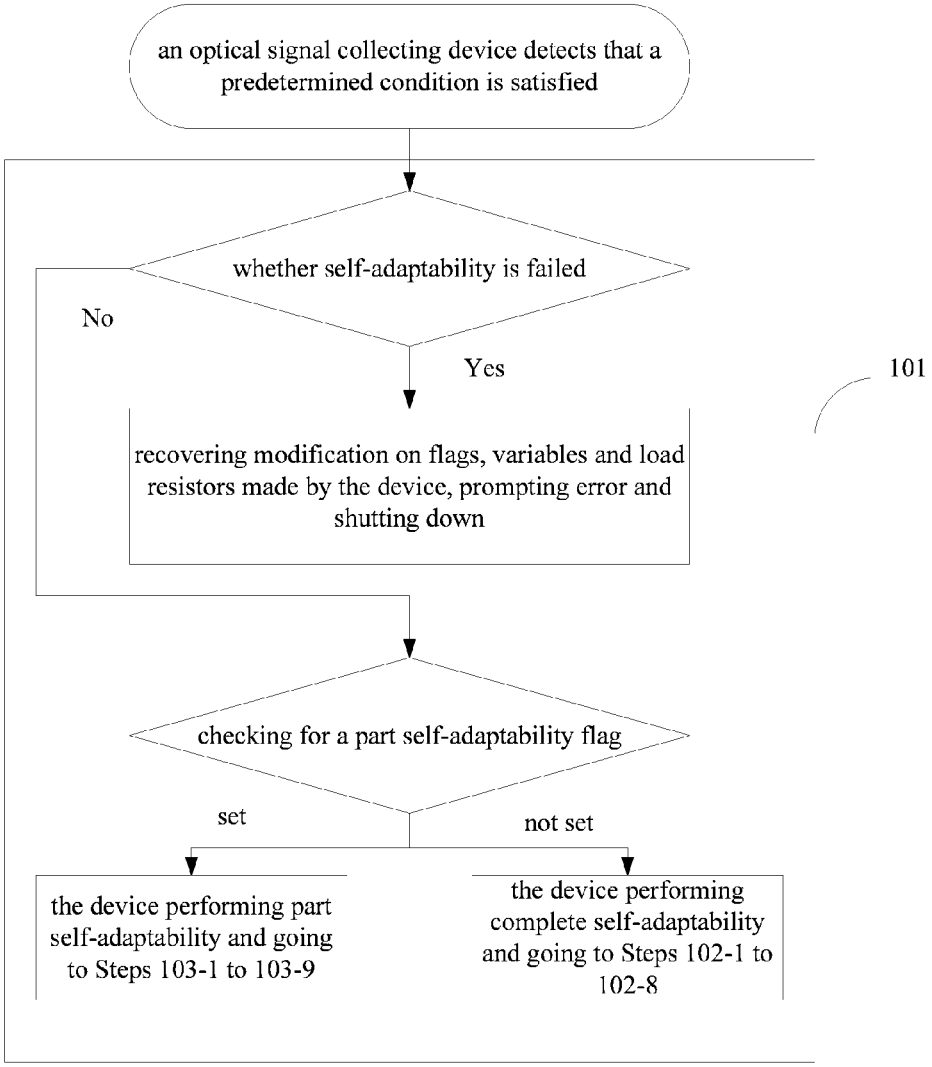
an optical signal collecting device detects that a predetermined condition is satisfied
whether self-adaptability is failed
No
Yes
101
recovering modification on flags, variables and load resistors made by the device, prompting error and shutting down
checking for a part self-adaptability flag
set
not set
the device performing part self-adaptability and going to Steps 103-1 to 103-9
the device performing complete self-adaptability and going to Steps 102-1 to 102-8

FIG. 2

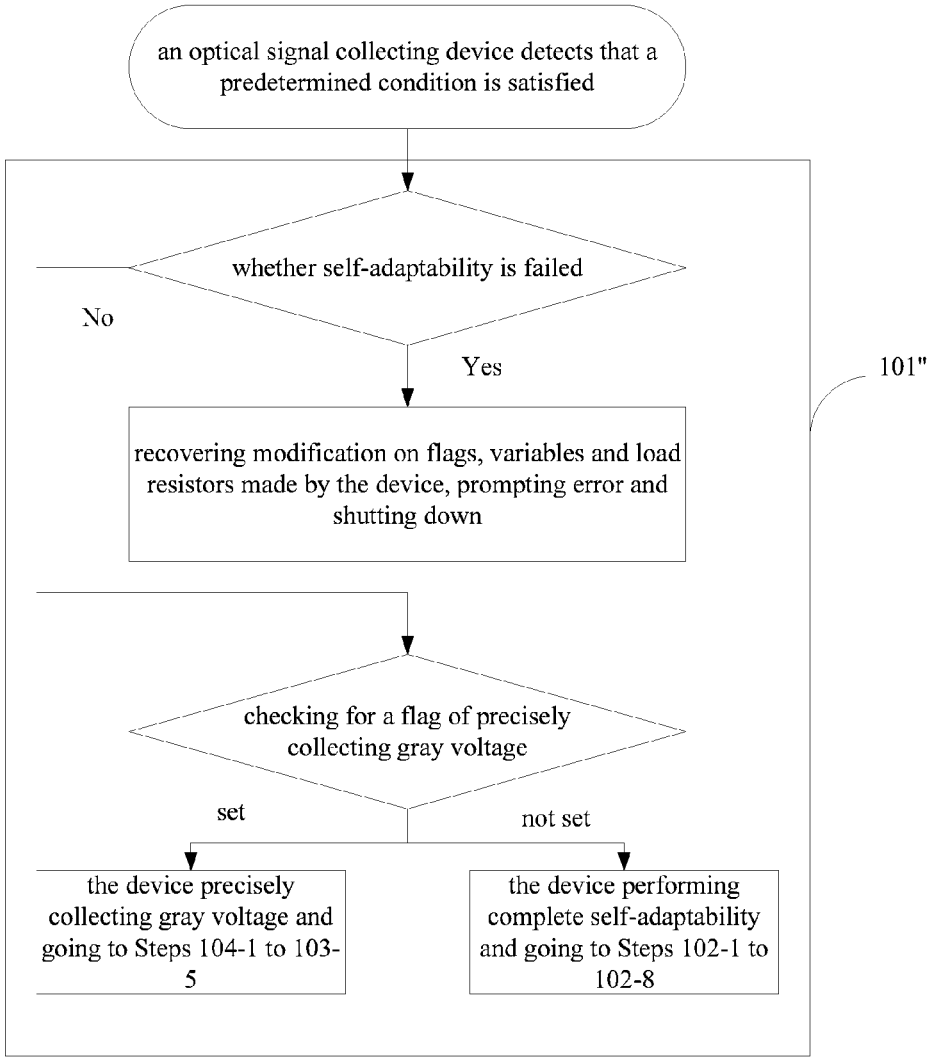
an optical signal collecting device detects that a predetermined condition is satisfied
whether self-adaptability is failed
No
Yes
101"
recovering modification on flags, variables and load resistors made by the device, prompting error and shutting down
checking for a flag of precisely collecting gray voltage
set
not set
the device precisely collecting gray voltage and going to Steps 104-1 to 103-5
the device performing complete self-adaptability and going to Steps 102-1 to 102-8

FIG. 3

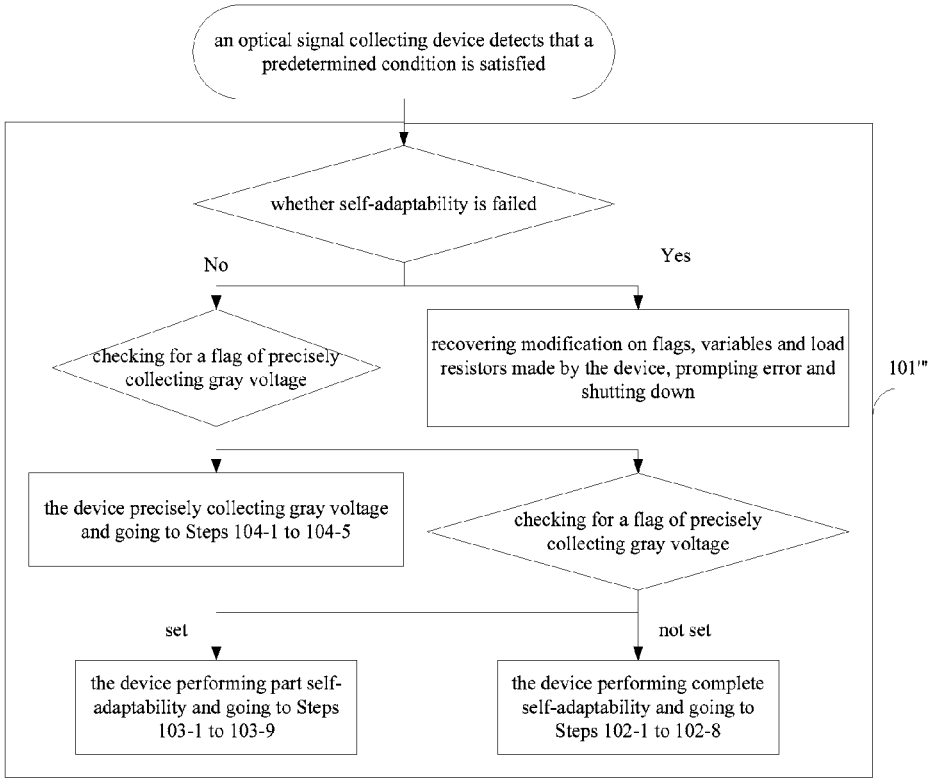
an optical signal collecting device detects that a predetermined condition is satisfied
whether self-adaptability is failed
No
Yes
checking for a flag of precisely collecting gray voltage
recovering modification on flags, variables and load resistors made by the device, prompting error and shutting down
101'"
the device precisely collecting gray voltage and going to Steps 104-1 to 104-5
checking for a flag of precisely collecting gray voltage
set
not set
the device performing part self-adaptability and going to Steps 103-1 to 103-9
the device performing complete self-adaptability and going to Steps 102-1 to 102-8

FIG. 4

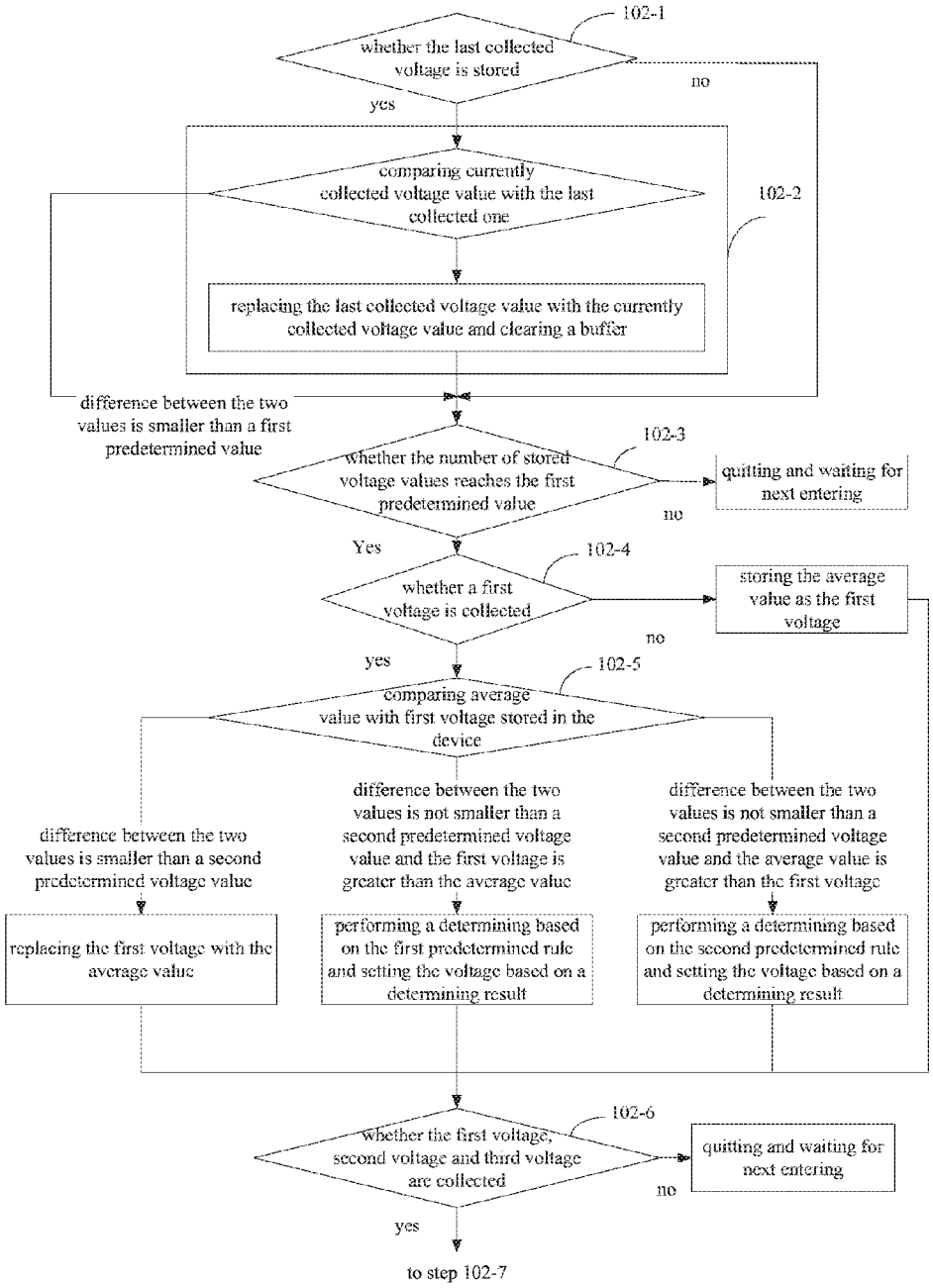
102-1
whether the last collected voltage is stored
no
yes
comparing currently collected voltage value with the last collected one
102-2
replacing the last collected voltage value with the currently collected voltage value and clearing a buffer
difference between the two values is smaller than a first predetermined value
102-3
whether the number of stored voltage values reaches the first predetermined value
quitting and waiting for next entering
no
Yes
102-4
whether a first voltage is collected
storing the average value as the first voltage
no
yes
102-5
comparing average value with first voltage stored in the device
difference between the two values is smaller than a second predetermined voltage value
difference between the two values is not smaller than a second predetermined voltage value and the first voltage is greater than the average value
difference between the two values is not smaller than a second predetermined voltage value and the average value is greater than the first voltage
replacing the first voltage with the average value
performing a determining based on the first predetermined rule and setting the voltage based on a determining result
performing a determining based on the second predetermined rule and setting the voltage based on a determining result
102-6
whether the first voltage, second voltage and third voltage are collected
quitting and waiting for next entering
no
yes
to step 102-7

FIG. 5-a

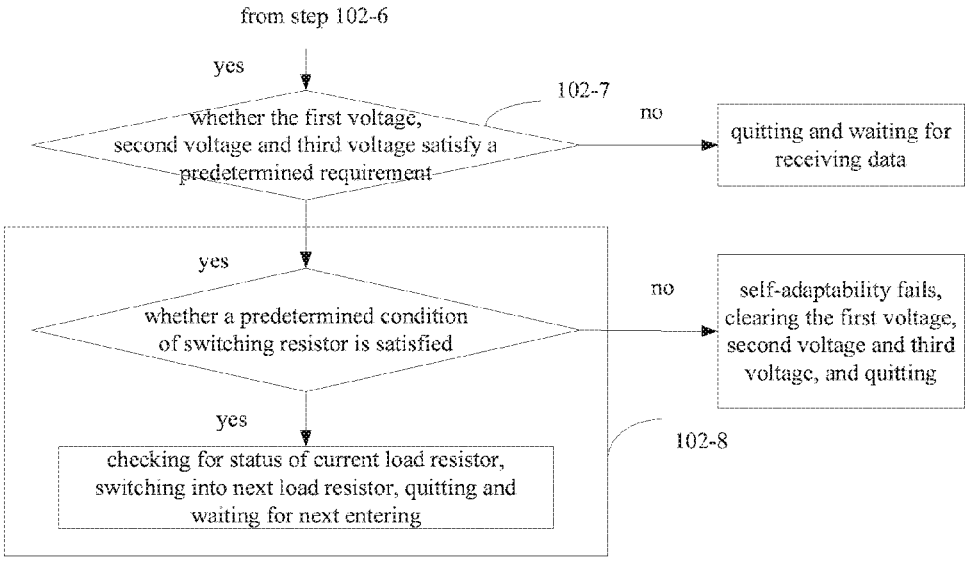
from step 102-6
yes
whether the first voltage, second voltage and third voltage satisfy a predetermined requirement
102-7
no
quitting and waiting for receiving data
yes
whether a predetermined condition of switching resistor is satisfied
no
self-adaptability fails, clearing the first voltage, second voltage and third voltage, and quitting
yes
checking for status of current load resistor, switching into next load resistor, quitting and waiting for next entering
102-8

FIG. 5-b

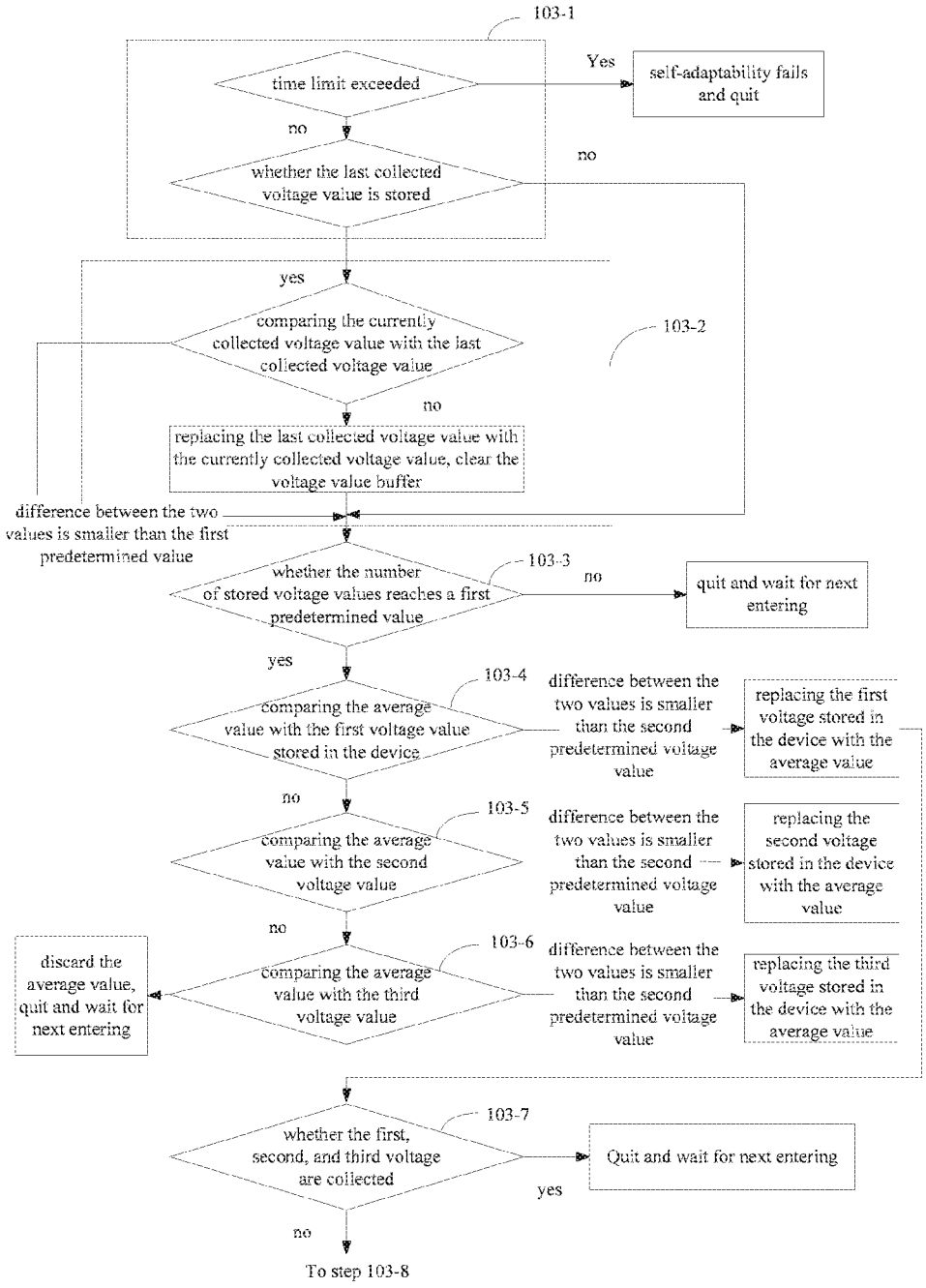
103-1
time limit exceeded
Yes
self-adaptability fails and quit
no
whether the last collected voltage value is stored
no
yes
comparing the currently collected voltage value with the last collected voltage value
103-2
no
replacing the last collected voltage value with the currently collected voltage value, clear the voltage value buffer
difference between the two values is smaller than the first predetermined value
whether the number of stored voltage values reaches a first predetermined value
103-3
no
quit and wait for next entering
yes
comparing the average value with the first voltage value stored in the device
103-4
difference between the two values is smaller than the second predetermined voltage value
replacing the first voltage stored in the device with the average value
no
comparing the average value with the second voltage value
103-5
difference between the two values is smaller than the second predetermined voltage value
replacing the second voltage stored in the device with the average value
no
comparing the average value with the third voltage value
103-6
difference between the two values is smaller than the second predetermined voltage value
replacing the third voltage stored in the device with the average value
discard the average value, quit and wait for next entering
whether the first, second, and third voltage are collected
103-7
Quit and wait for next entering
yes
no
To step 103-8

FIG. 6-a

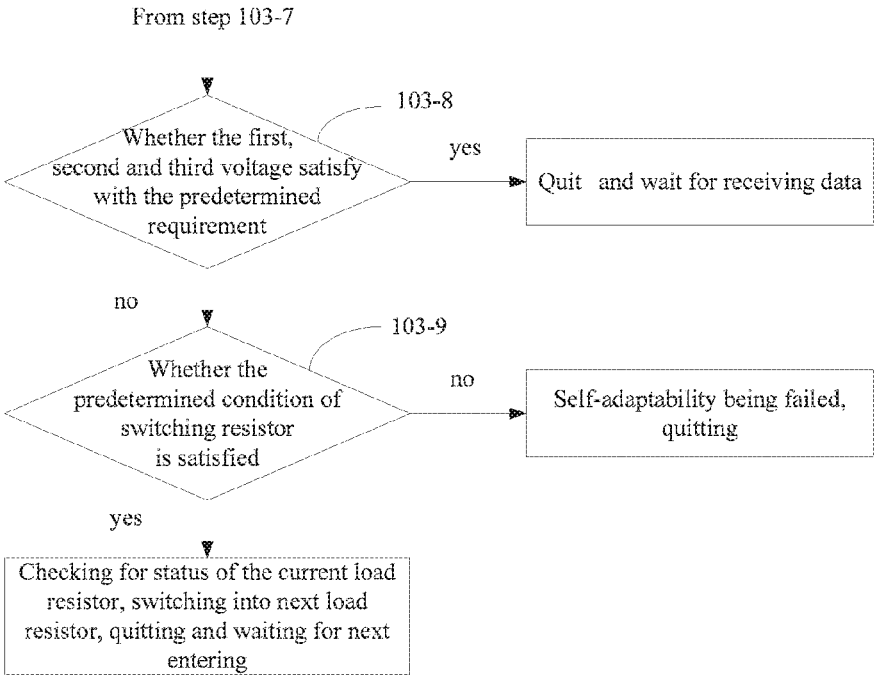
From step 103-7
103-8
Whether the first, second and third voltage satisfy with the predetermined requirement
yes
Quit and wait for receiving data
no
103-9
Whether the predetermined condition of switching resistor is satisfied
no
Self-adaptability being failed, quitting
yes
Checking for status of the current load resistor, switching into next load resistor, quitting and waiting for next entering

FIG. 6-b

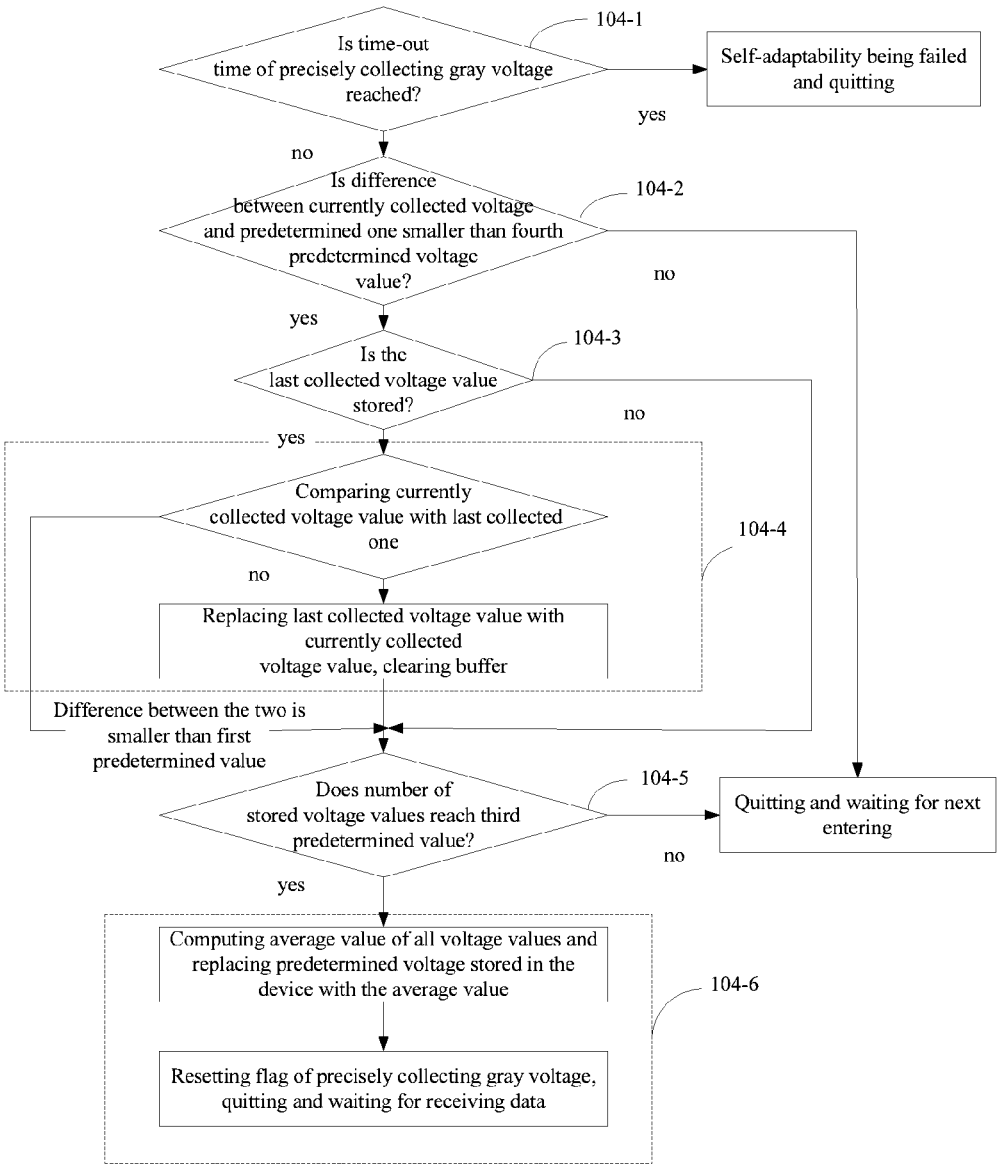
104-1
Is time-out time of precisely collecting gray voltage reached?
Self-adaptability being failed and quitting
yes
no
Is difference between currently collected voltage and predetermined one smaller than fourth predetermined voltage value?
104-2
no
yes
Is the last collected voltage value stored?
104-3
no
yes
Comparing currently collected voltage value with last collected one
104-4
no
Replacing last collected voltage value with currently collected voltage value, clearing buffer
Difference between the two is smaller than first predetermined value
Does number of stored voltage values reach third predetermined value?
104-5
Quitting and waiting for next entering
no
yes
Computing average value of all voltage values and replacing predetermined voltage stored in the device with the average value
104-6
Resetting flag of precisely collecting gray voltage, quitting and waiting for receiving data

FIG. 7

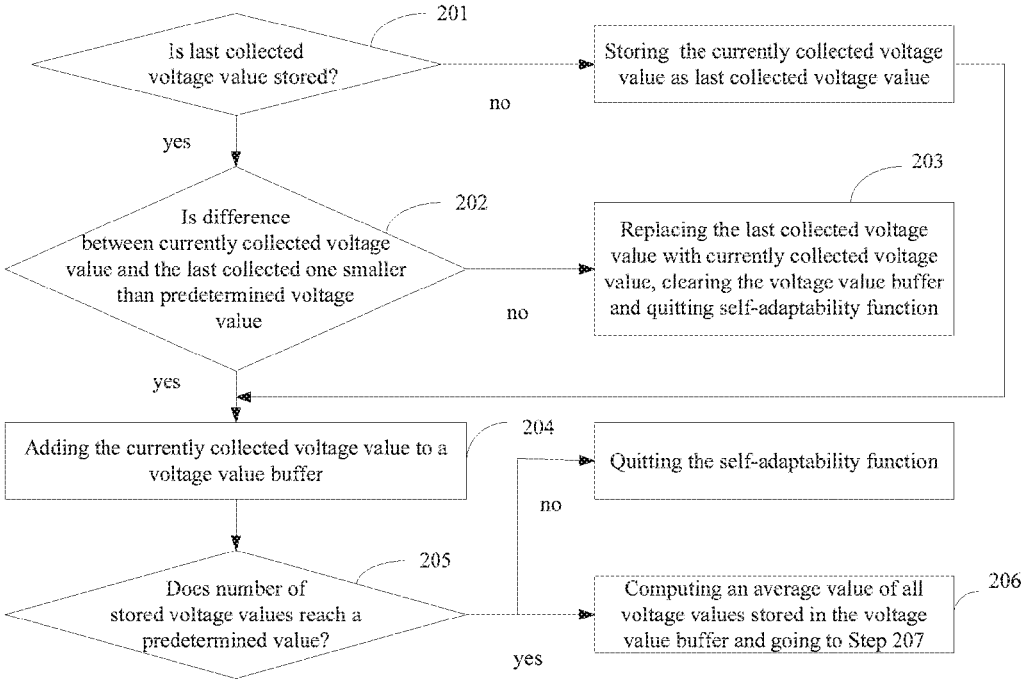
201
Is last collected voltage value stored?
no
Storing the currently collected voltage value as last collected voltage value
yes
203
202
Is difference between currently collected voltage value and the last collected one smaller than predetermined voltage value
Replacing the last collected voltage value with currently collected voltage value, clearing the voltage value buffer and quitting self-adaptability function
no
yes
204
Adding the currently collected voltage value to a voltage value buffer
Quitting the self-adaptability function
no
205
206
Does number of stored voltage values reach a predetermined value?
Computing an average value of all voltage values stored in the voltage value buffer and going to Step 207
yes

FIG. 8-a

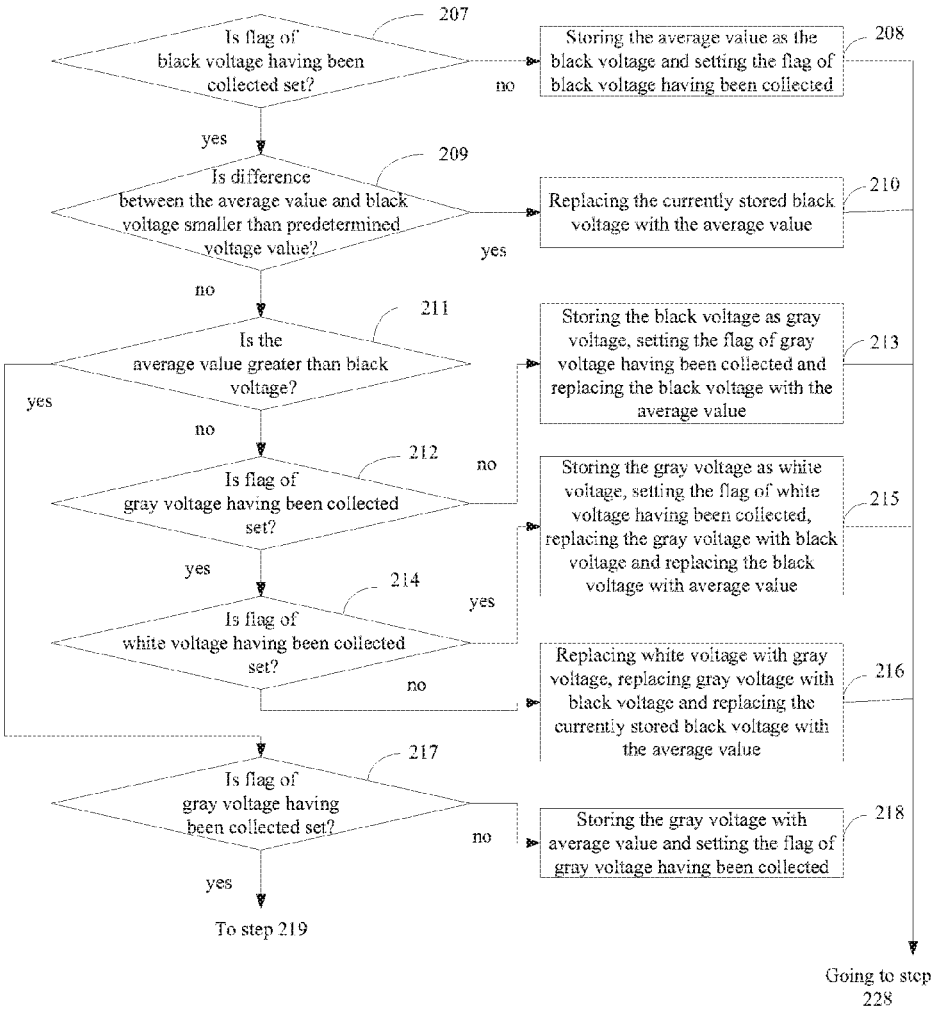
207
Is flag of black voltage having been collected set?
no
Storing the average value as the black voltage and setting the flag of black voltage having been collected
208
yes
209
Is difference between the average value and black voltage smaller than predetermined voltage value?
Replacing the currently stored black voltage with the average value
210
yes
no
211
Is the average value greater than black voltage?
Storing the black voltage as gray voltage, setting the flag of gray voltage having been collected and replacing the black voltage with the average value
213
yes
no
212
Is flag of gray voltage having been collected set?
no
Storing the gray voltage as white voltage, setting the flag of white voltage having been collected, replacing the gray voltage with black voltage and replacing the black voltage with average value
215
yes
214
Is flag of white voltage having been collected set?
yes
no
Replacing white voltage with gray voltage, replacing gray voltage with black voltage and replacing the currently stored black voltage with the average value
216
217
Is flag of gray voltage having been collected set?
no
Storing the gray voltage with average value and setting the flag of gray voltage having been collected
218
yes
To step 219
Going to step 228

FIG. 8-b

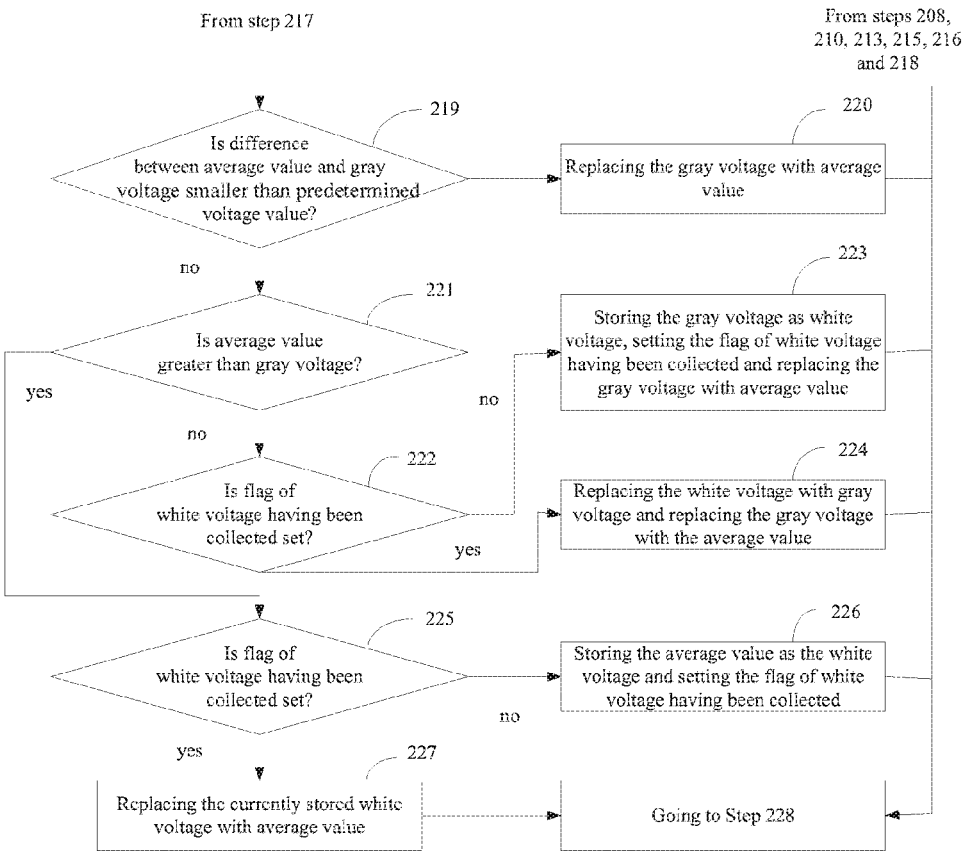
From step 217
From steps 208, 210, 213, 215, 216 and 218
219
Is difference between average value and gray voltage smaller than predetermined voltage value?
220
Replacing the gray voltage with average value
no
221
Is average value greater than gray voltage?
223
Storing the gray voltage as white voltage, setting the flag of white voltage having been collected and replacing the gray voltage with average value
yes
no
no
222
Is flag of white voltage having been collected set?
224
Replacing the white voltage with gray voltage and replacing the gray voltage with the average value
yes
225
Is flag of white voltage having been collected set?
226
Storing the average value as the white voltage and setting the flag of white voltage having been collected
no
yes
227
Replacing the currently stored white voltage with average value
Going to Step 228

FIG. 8-c

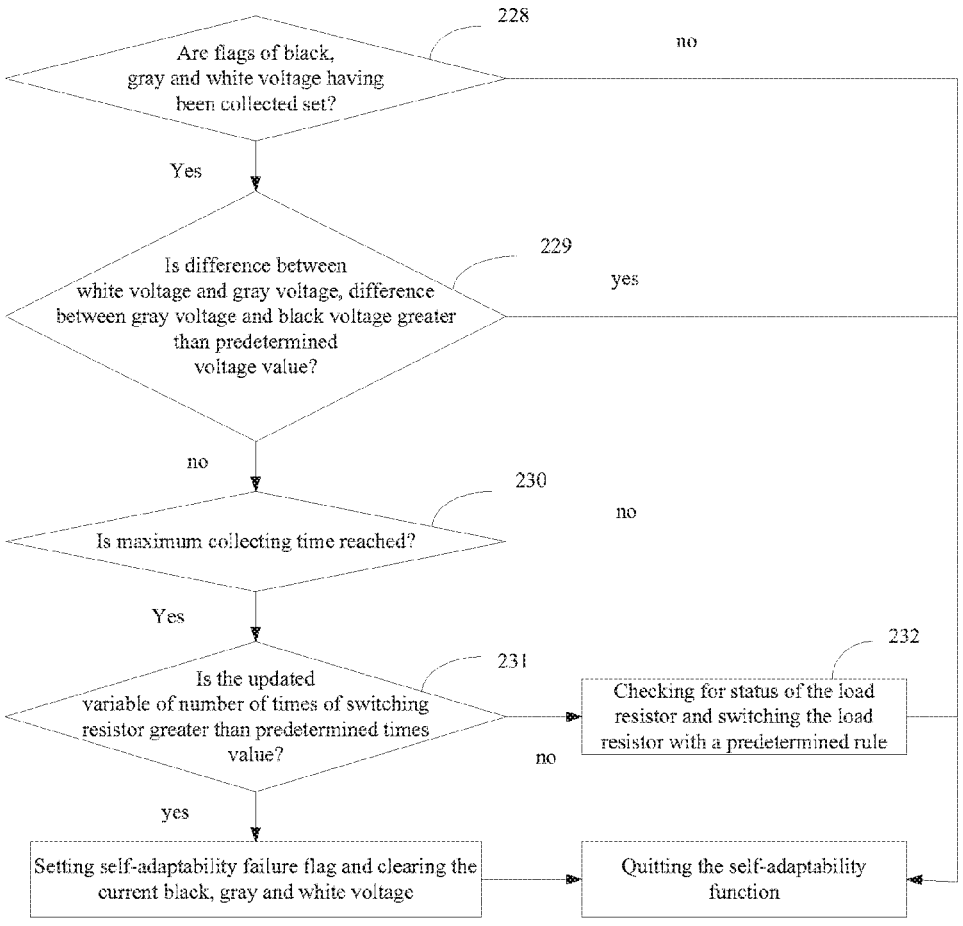
228
Are flags of black, gray and white voltage having been collected set?
no
Yes
229
Is difference between white voltage and gray voltage, difference between gray voltage and black voltage greater than predetermined voltage value?
yes
no
230
Is maximum collecting time reached?
no
Yes
231
Is the updated variable of number of times of switching resistor greater than predetermined times value?
232
Checking for status of the load resistor and switching the load resistor with a predetermined rule
no
yes
Setting self-adaptability failure flag and clearing the current black, gray and white voltage
Quitting the self-adaptability function

FIG. 8-d

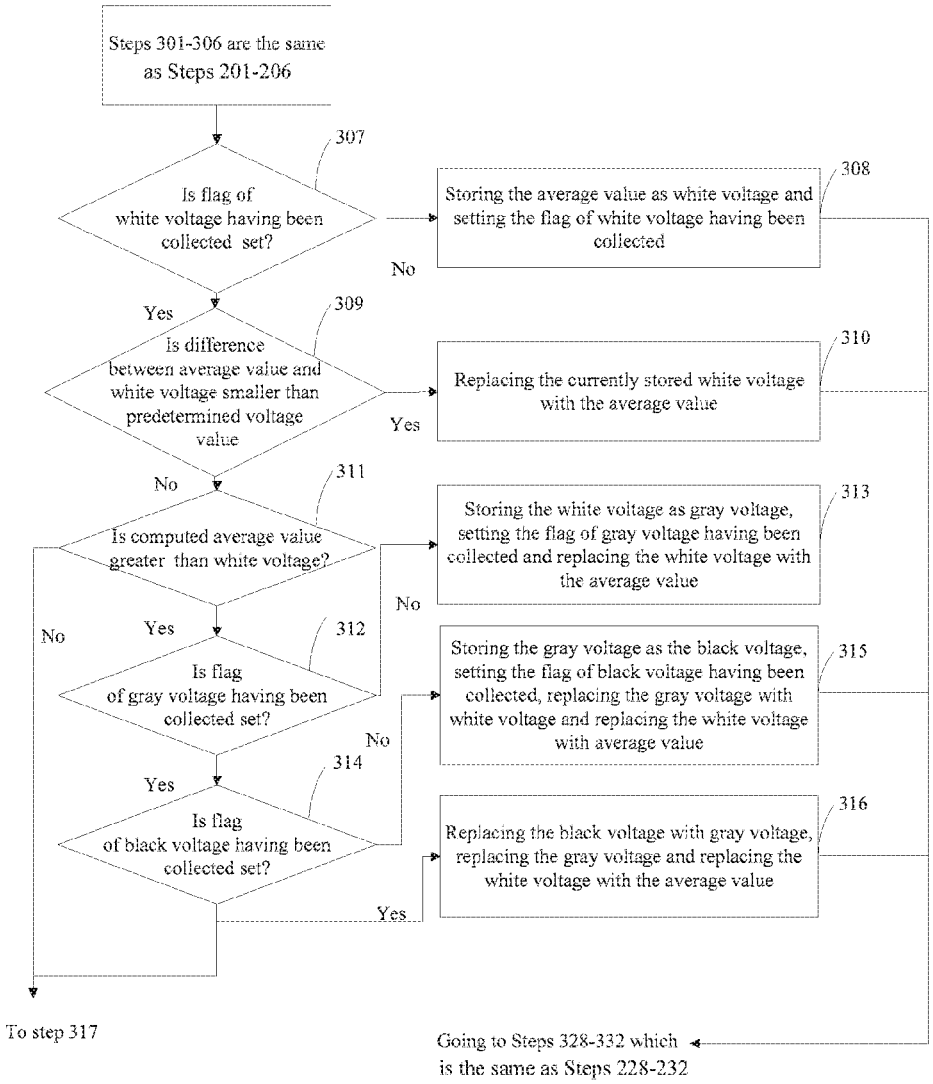
Steps 301-306 are the same as Steps 201-206
307
Is flag of white voltage having been collected set?
No
Storing the average value as white voltage and setting the flag of white voltage having been collected
308
Yes
309
Is difference between average value and white voltage smaller than predetermined voltage value
Yes
Replacing the currently stored white voltage with the average value
310
No
311
Is computed average value greater than white voltage?
No
Storing the white voltage as gray voltage, setting the flag of gray voltage having been collected and replacing the white voltage with the average value
313
No
Yes
312
Is flag of gray voltage having been collected set?
No
Storing the gray voltage as the black voltage, setting the flag of black voltage having been collected, replacing the gray voltage with white voltage and replacing the white voltage with average value
315
Yes
314
Is flag of black voltage having been collected set?
Replacing the black voltage with gray voltage, replacing the gray voltage and replacing the white voltage with the average value
316
Yes
To step 317
Going to Steps 328-332 which is the same as Steps 228-232

FIG. 9-a

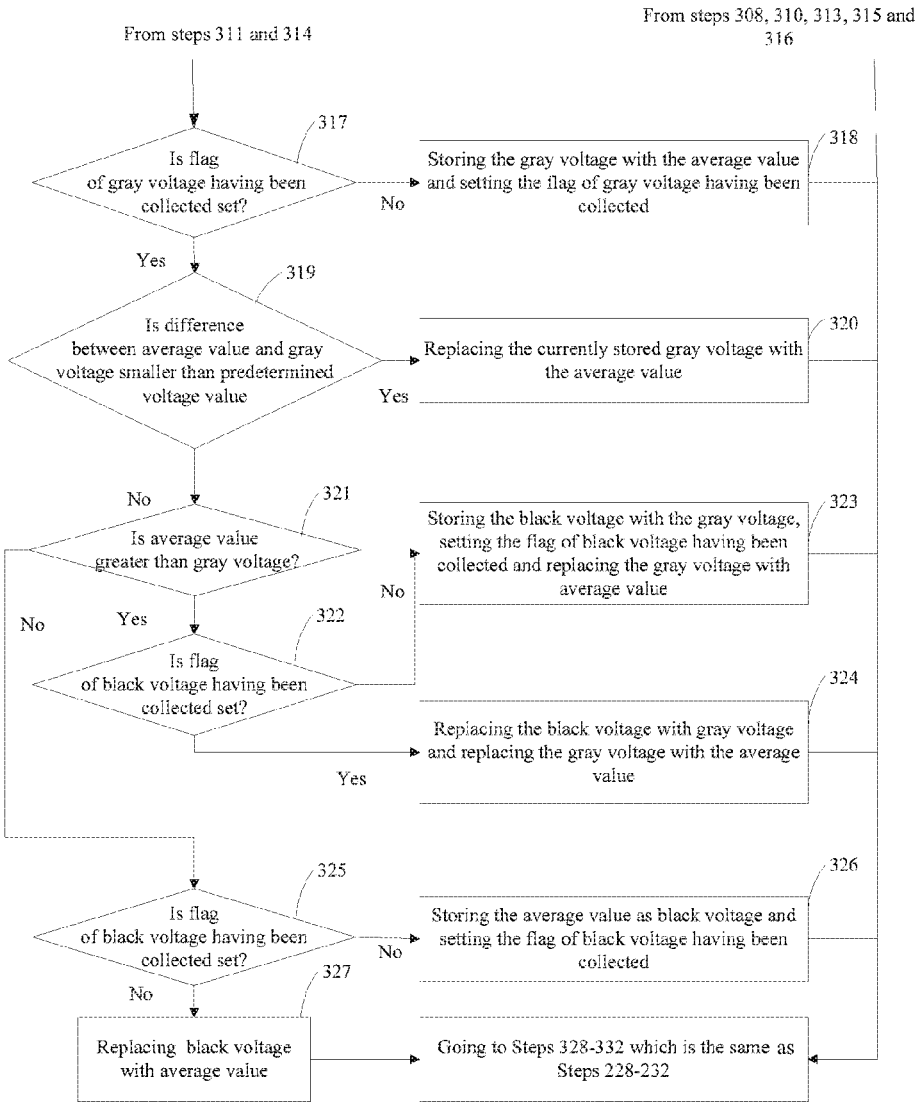
From steps 311 and 314
From steps 308, 310, 313, 315 and 316
317
Is flag of gray voltage having been collected set?
No
318
Storing the gray voltage with the average value and setting the flag of gray voltage having been collected
Yes
319
Is difference between average value and gray voltage smaller than predetermined voltage value
Yes
320
Replacing the currently stored gray voltage with the average value
No
321
Is average value greater than gray voltage?
No
323
Storing the black voltage with the gray voltage, setting the flag of black voltage having been collected and replacing the gray voltage with average value
No
Yes
322
Is flag of black voltage having been collected set?
324
Replacing the black voltage with gray voltage and replacing the gray voltage with the average value
Yes
325
Is flag of black voltage having been collected set?
No
326
Storing the average value as black voltage and setting the flag of black voltage having been collected
No
327
Replacing black voltage with average value
Going to Steps 328-332 which is the same as Steps 228-232

FIG. 9-b

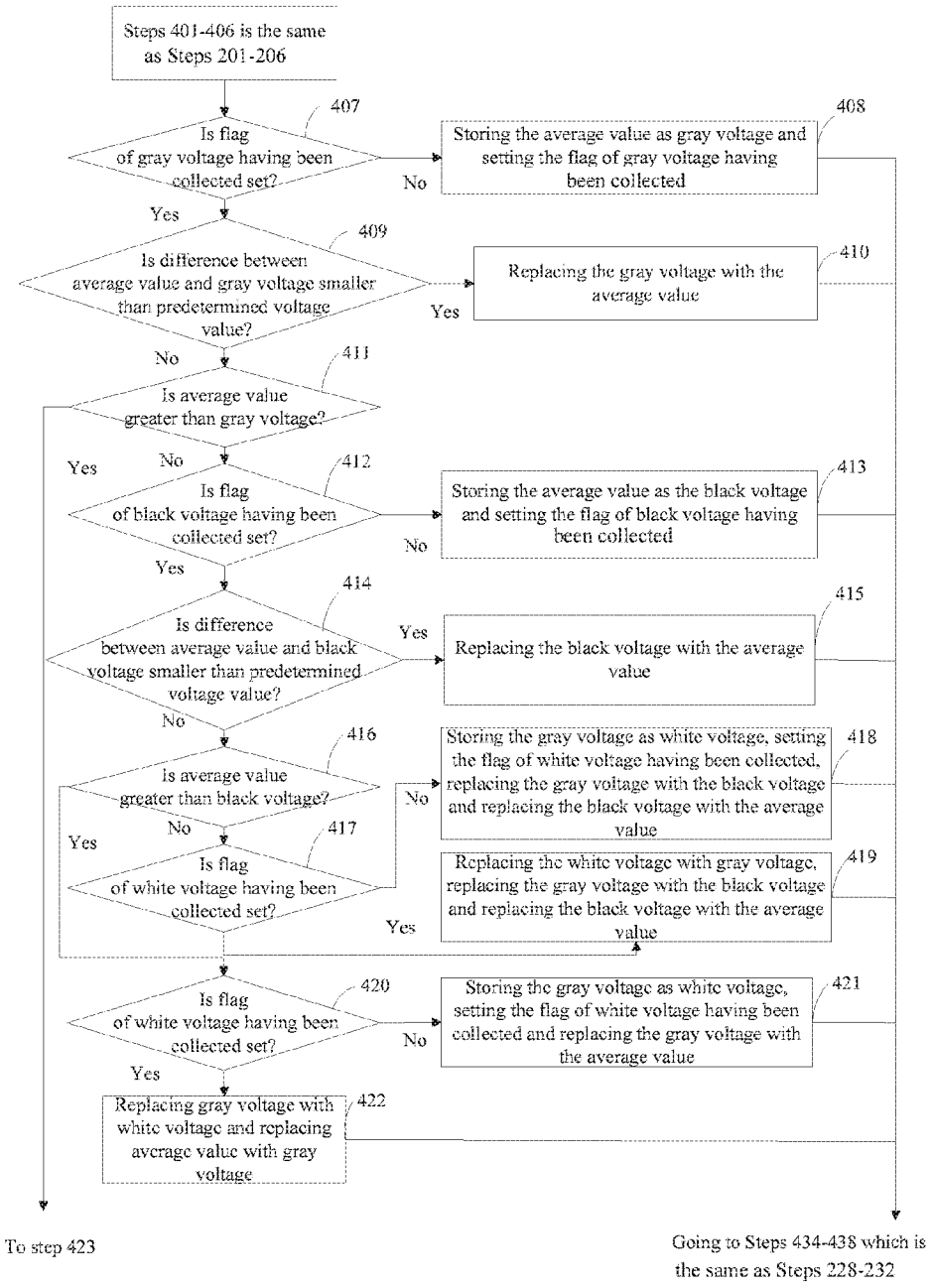
Steps 401-406 is the same as Steps 201-206
407
Is flag of gray voltage having been collected set?
No
408
Storing the average value as gray voltage and setting the flag of gray voltage having been collected
Yes
409
Is difference between average value and gray voltage smaller than predetermined voltage value?
Yes
410
Replacing the gray voltage with the average value
No
411
Is average value greater than gray voltage?
Yes
No
412
Is flag of black voltage having been collected set?
No
413
Storing the average value as the black voltage and setting the flag of black voltage having been collected
Yes
414
Is difference between average value and black voltage smaller than predetermined voltage value?
Yes
415
Replacing the black voltage with the average value
No
416
Is average value greater than black voltage?
No
418
Storing the gray voltage as white voltage, setting the flag of white voltage having been collected, replacing the gray voltage with the black voltage and replacing the black voltage with the average value
Yes
No
417
Is flag of white voltage having been collected set?
419
Replacing the white voltage with gray voltage, replacing the gray voltage with the black voltage and replacing the black voltage with the average value
Yes
420
Is flag of white voltage having been collected set?
No
421
Storing the gray voltage as white voltage, setting the flag of white voltage having been collected and replacing the gray voltage with the average value
Yes
422
Replacing gray voltage with white voltage and replacing average value with gray voltage
To step 423
Going to Steps 434-438 which is the same as Steps 228-232

FIG. 10-a

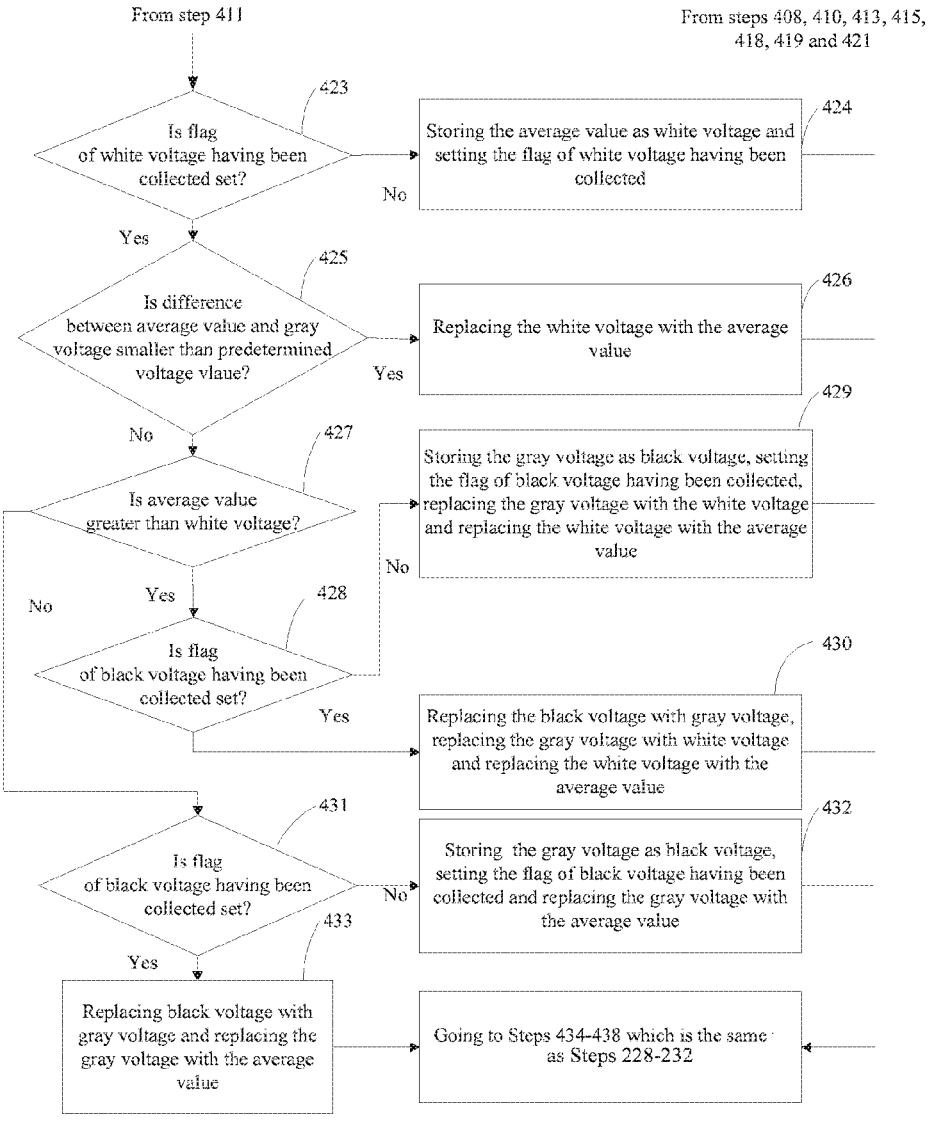
From step 411
From steps 408, 410, 413, 415, 418, 419 and 421
423
Is flag of white voltage having been collected set?
No
Storing the average value as white voltage and setting the flag of white voltage having been collected
424
Yes
425
Is difference between average value and gray voltage smaller than predetermined voltage vlaue?
Yes
Replacing the white voltage with the average value
426
No
427
Is average value greater than white voltage?
No
Storing the gray voltage as black voltage, setting the flag of black voltage having been collected, replacing the gray voltage with the white voltage and replacing the white voltage with the average value
429
Yes
428
No
Is flag of black voltage having been collected set?
Yes
Replacing the black voltage with gray voltage, replacing the gray voltage with white voltage and replacing the white voltage with the average value
430
431
Is flag of black voltage having been collected set?
No
Storing the gray voltage as black voltage, setting the flag of black voltage having been collected and replacing the gray voltage with the average value
432
Yes
433
Replacing black voltage with gray voltage and replacing the gray voltage with the average value
Going to Steps 434-438 which is the same as Steps 228-232

FIG. 10-b

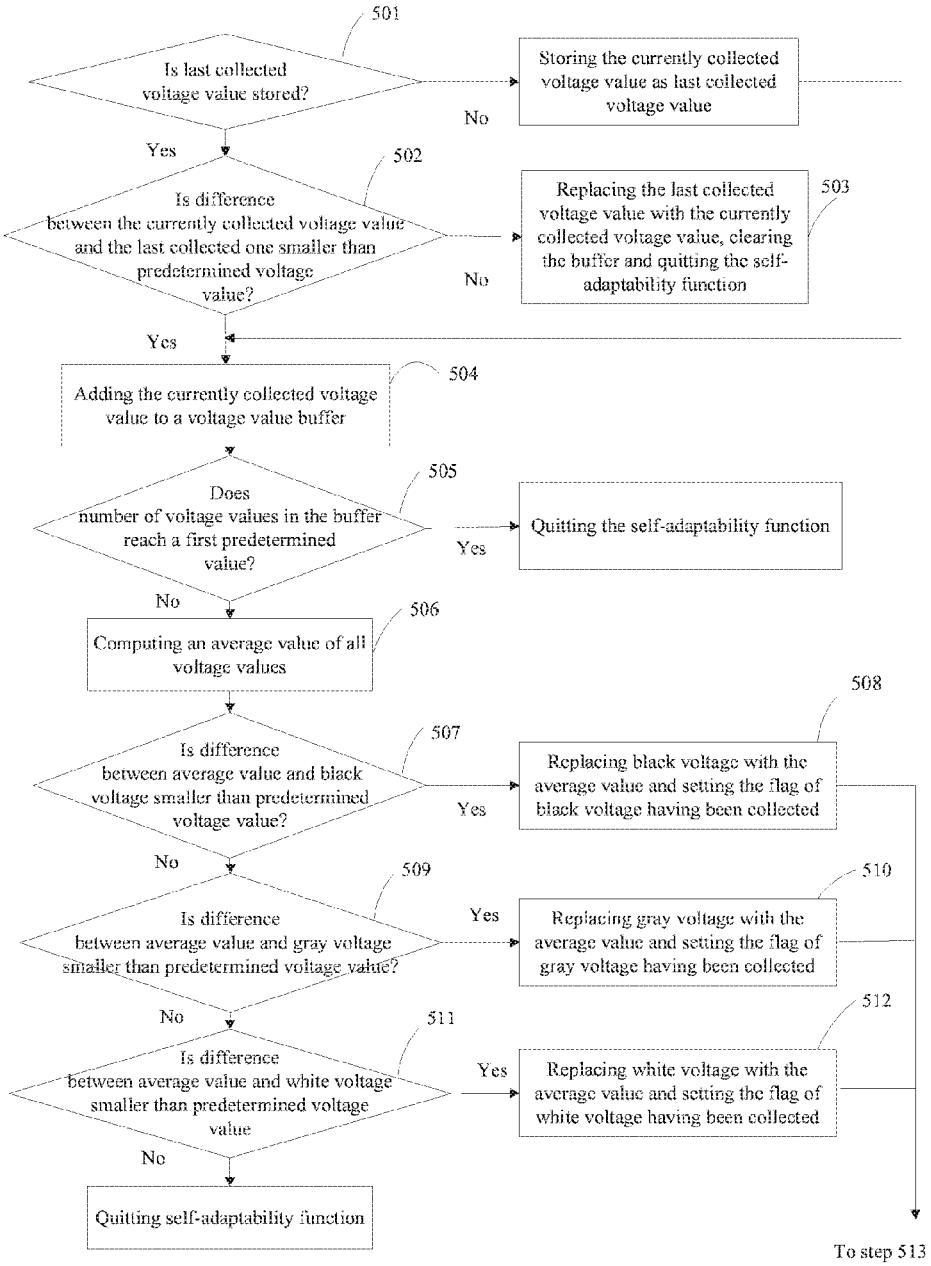
501
Is last collected voltage value stored?
No
Storing the currently collected voltage value as last collected voltage value
Yes
502
Is difference between the currently collected voltage value and the last collected one smaller than predetermined voltage value?
No
Replacing the last collected voltage value with the currently collected voltage value, clearing the buffer and quitting the self-adaptability function
503
Yes
Adding the currently collected voltage value to a voltage value buffer
504
Does number of voltage values in the buffer reach a first predetermined value?
505
Yes
Quitting the self-adaptability function
No
Computing an average value of all voltage values
506
Is difference between average value and black voltage smaller than predetermined voltage value?
507
Yes
Replacing black voltage with the average value and setting the flag of black voltage having been collected
508
No
Is difference between average value and gray voltage smaller than predetermined voltage value?
509
Yes
Replacing gray voltage with the average value and setting the flag of gray voltage having been collected
510
No
Is difference between average value and white voltage smaller than predetermined voltage value
511
Yes
Replacing white voltage with the average value and setting the flag of white voltage having been collected
512
No
Quitting self-adaptability function
To step 513

FIG. 11-a

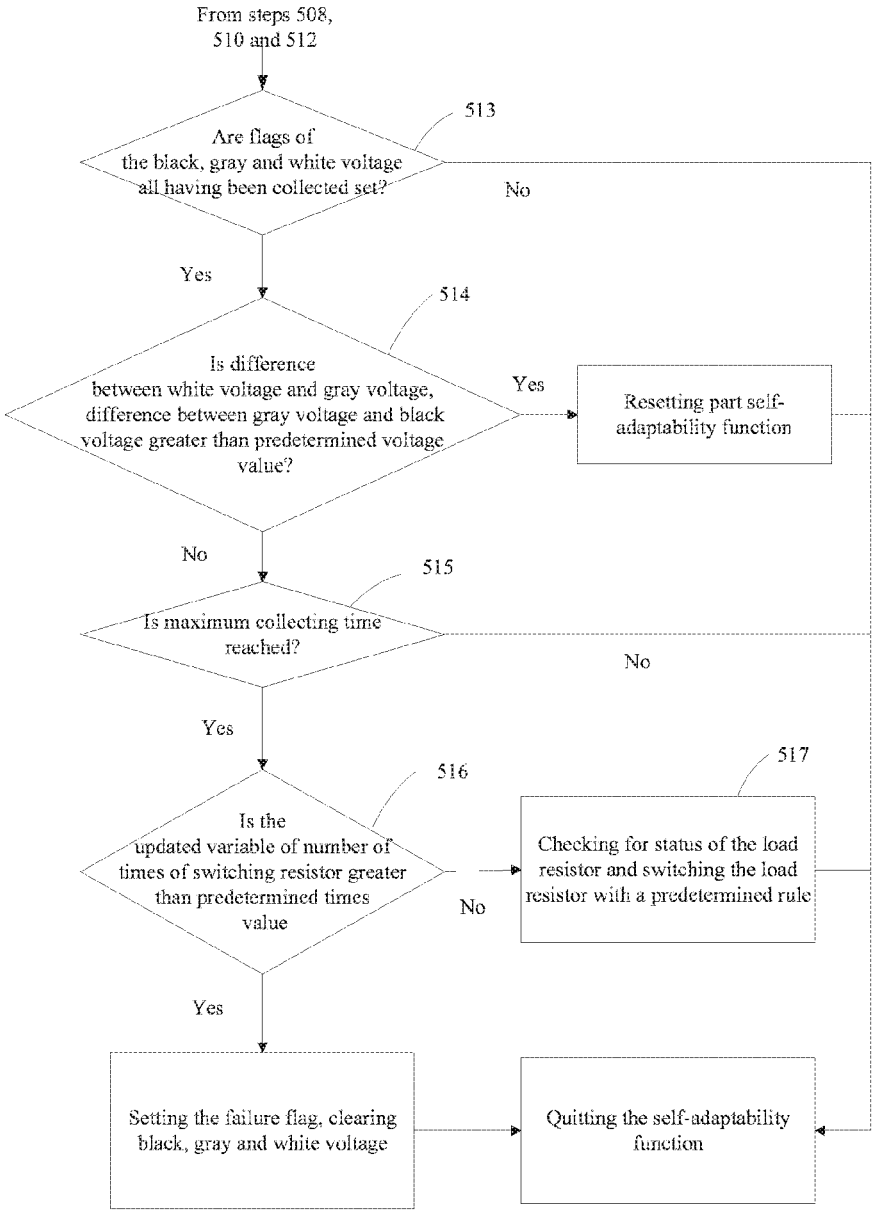
From steps 508, 510 and 512
513
Are flags of the black, gray and white voltage all having been collected set?
No
Yes
514
Is difference between white voltage and gray voltage, difference between gray voltage and black voltage greater than predetermined voltage value?
Yes
Resetting part self-adaptability function
No
515
Is maximum collecting time reached?
No
Yes
516
Is the updated variable of number of times of switching resistor greater than predetermined times value
No
517
Checking for status of the load resistor and switching the load resistor with a predetermined rule
Yes
Setting the failure flag, clearing black, gray and white voltage
Quitting the self-adaptability function

FIG. 11-b

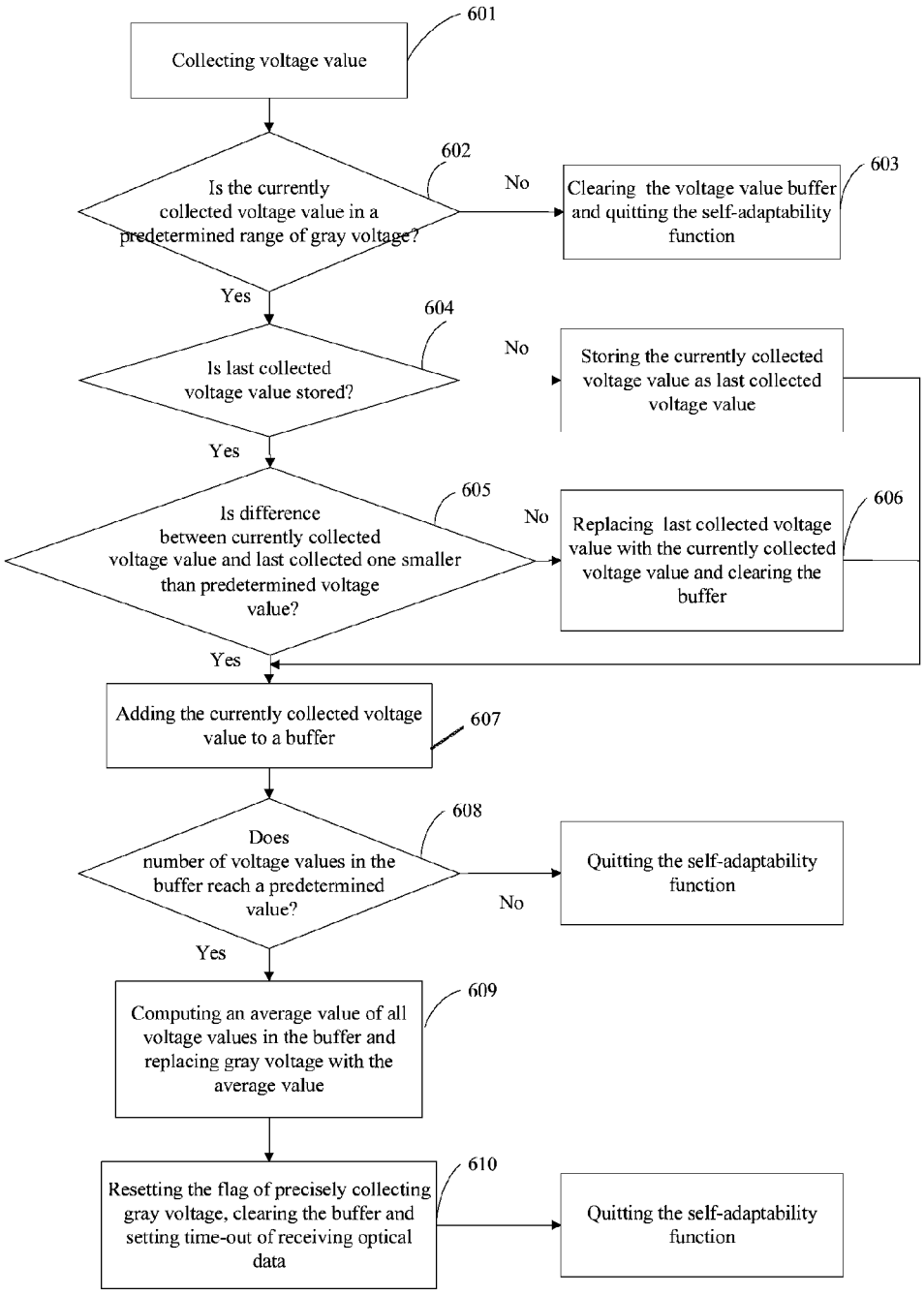
601
Collecting voltage value
602
Is the currently collected voltage value in a predetermined range of gray voltage?
No
603
Clearing the voltage value buffer and quitting the self-adaptability function
Yes
604
Is last collected voltage value stored?
No
Storing the currently collected voltage value as last collected voltage value
Yes
605
Is difference between currently collected voltage value and last collected one smaller than predetermined voltage value?
No
606
Replacing last collected voltage value with the currently collected voltage value and clearing the buffer
Yes
Adding the currently collected voltage value to a buffer
607
608
Does number of voltage values in the buffer reach a predetermined value?
No
Quitting the self-adaptability function
Yes
Computing an average value of all voltage values in the buffer and replacing gray voltage with the average value
609
610
Resetting the flag of precisely collecting gray voltage, clearing the buffer and setting time-out of receiving optical data
Quitting the self-adaptability function

FIG. 12

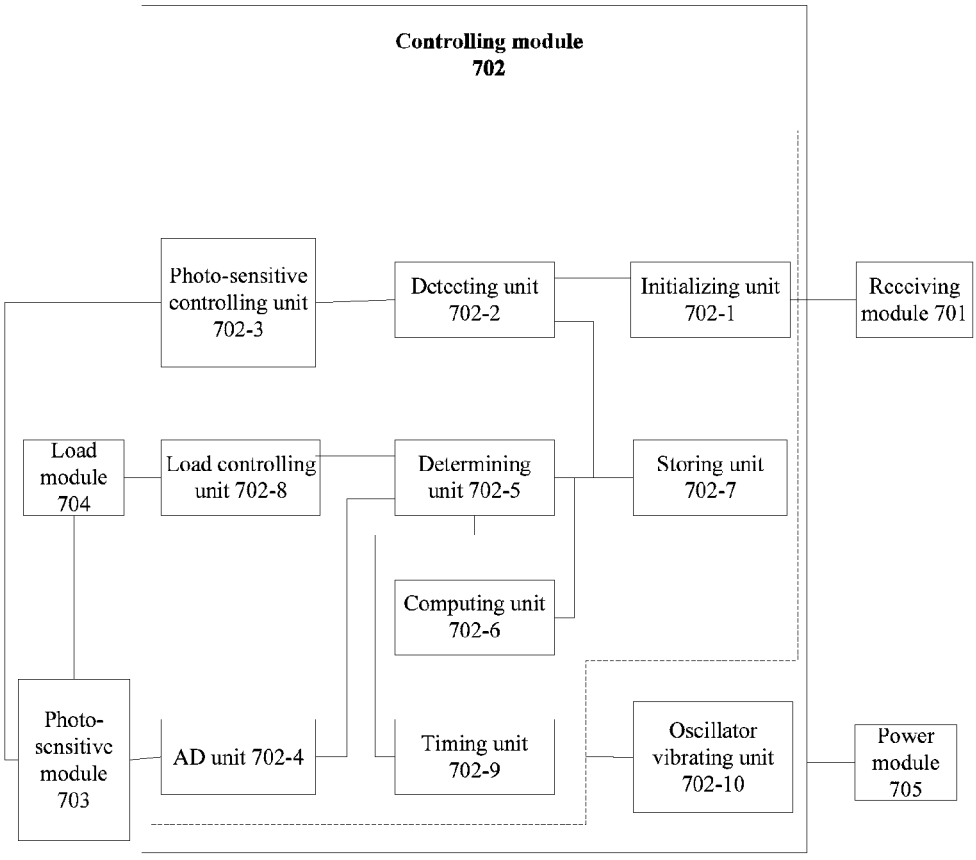
Controlling module
702
Photo-sensitive controlling unit 702-3
Detecting unit 702-2
Initializing unit 702-1
Receiving module 701
Load module 704
Load controlling unit 702-8
Determining unit 702-5
Storing unit 702-7
Computing unit 702-6
Photo-sensitive module 703
AD unit 702-4
Timing unit 702-9
Oscillator vibrating unit 702-10
Power module 705

FIG. 13

METHOD FOR IMPROVING LUMINOUS INTENSITY ADAPTABILITY AND DEVICE THEREOF

FIELD OF THE INVENTION

The invention relates to photo-electronic communication field and particularly relates to a method for improving luminous intensity adaptability and a device thereof.

BACKGROUND OF THE INVENTION

In the current market, a display screen quite differs from a mobile phone screen, luminous range of the display screen also differs from luminous range of the mobile phone, and display effect of a screen is influenced greatly by environment. The present optical elements are mostly current-driven and sense luminous intensity by matching an appropriate load resistor. Disadvantage of the present optical elements is: it is difficult to determine resistance of the load resistor in the case that there is a big change in range of luminous intensity. Even the resistance of the load resistor is determined, since the resistance is a constant value, therefore there is a small adaptability range of the resistance on luminous intensity.

SUMMARY OF THE INVENTION

In consideration of shortcomings in prior art, in order to improve luminous intensity adaptability of a screen during collecting optical signal, a method for improving luminous intensity adaptability and a device thereof are provided according to the present invention.

The solution of the present invention is disclosed as follows.

A method for improving luminous intensity adaptability of an optical signal collecting device is disclosed. The device controls a predetermined load resistor to conduct upon receiving a self-adaptability request, the device collects and sets voltage upon being satisfied with a predetermined condition, and the load resistor has an influence on collecting of the voltage. The method includes:

Step a, determining whether a self-adaptability is failed, if yes, restoring modifications on flags, variables and load resistors, prompting error and quitting, otherwise, collecting a voltage value and if the device stores a last collected voltage value, going to Step b; otherwise going to Step c;

Step b, comparing currently collected voltage value with a last collected voltage value, if difference between the two values is smaller than a predetermined voltage value, going to Step c; otherwise replacing the last collected voltage value with the currently collected voltage value, clearing a voltage value buffer and going to Step c;

Step c, adding the currently collected voltage value to the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches a first predetermined value, if yes, going to Step d; otherwise, quitting and waiting for next entering;

Step d, computing an average value of all voltage values stored in the voltage value buffer and determining whether a first voltage is reached, if yes, going to Step e; otherwise storing the computed average value as first voltage and going to Step f;

Step e, comparing the computed average value with the first voltage stored in the device, if difference between the two values is smaller than a second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to Step f; if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, setting voltage according to a first predetermined rule and going to Step f; if difference between the two values is not smaller than the second predetermined voltaic value and the former is greater, setting the voltage according to a second predetermined rule and going to Step f;

Step f, determining whether the first voltage, a second voltage and a third voltage are all collected, if yes, going to Step g; otherwise, quitting and waiting for next entering;

Step g, determining whether the first voltage, the second voltage and the third voltage stored in the device are all satisfied with a predetermined requirement, if yes, quitting and the device waiting for receiving data; otherwise going to Step h; and

Step h, determining whether a predetermined condition of switching resistor is satisfied with, if yes, checking for status of the current load resistor, switching into a next load resistor according to a predetermined rule, quitting and waiting for next entering and collecting voltage according to the next load resistor; otherwise, the self-adaptability being failed, clearing the first voltage, the second voltage and the third voltage stored in the device and quitting; wherein the predetermined condition of switching resistor is that times of switching resistor does not reach a second predetermined value.

In case that the device stores the first voltage, the second voltage and the third voltage in a voltage value high-to-low order of, the third voltage, the second voltage and the first voltage, correspondingly, the setting voltage according to a first predetermined rule includes:

(1), determining whether the second voltage is collected, if yes, going to (2); otherwise replacing the first voltage stored in the device with the computed average value, storing the first voltage stored in the device as the second voltage and going to Step f; and

(2), determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the second voltage stored in the device and replacing the second voltage stored in the device with the first voltage stored in the device and replacing, the first voltage stored in the device with the computed average value and going to Step f; otherwise, storing the second voltage stored in the device as the third voltage and replacing the second voltage stored in the device with the first voltage stored in the device and replacing the first voltage stored in the device with the computed average value and going to Step f;

the setting voltage according to a second predetermined rule includes:

(1), determining whether the second voltage is collected, if yes, going to (2); otherwise, storing the computed average value as the second voltage and going to Step f;

(2), comparing the computed average value with the second voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the second voltage stored in the device with the computed average value and going to Step f; if difference between the two values is not smaller than the second predetermined voltage value and the second voltage value stored in the device is greater, going to (3) subsequently; and if difference between the two values is not smaller than the second predetermined voltage value and the computed average value is greater, going to (4);

(3), determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the second voltage stored in the device and replacing the second voltage stored in the device with the computed average value

and going to Step f; otherwise, storing the second voltage stored in the device as the third voltage and replacing the second voltage stored in the device with the computed average value and going to Step f; and

(4), determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the computed average value and going to Step f; otherwise, storing the computed average value as the third voltage, and going to Step f;

and the predetermined requirement is that both difference between the third voltage stored in the device and the second voltage stored in the device and difference between the second voltage stored in the device and the first voltage stored in the device are greater than a third predetermined voltage value.

The device stores the first voltage, the second voltage and the third voltage in a voltage value high-to-low order of, the third voltage, the first voltage and the second voltage, correspondingly, the setting voltage according to a first predetermined rule includes:

(1), determining whether the second voltage is collected, if yes, going to (2); otherwise, storing the computed average value as the second voltage and going to Step f;

(2), comparing the computed average value with the second voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the second voltage stored in the device with the computed average value and going to Step f; if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, going to (3) subsequently; if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, going to (4);

(3), determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the first voltage stored in the device and replacing the first voltage stored in the device with the second voltage stored in the device and replacing the second voltage stored in the device with the computed average value and going to Step f; otherwise, storing the first voltage stored in the device as the third voltage and replacing the first voltage stored in the device with the second voltage stored in the device and replacing the second voltage stored in the device with the computed average value and going to Step f; and

(4), determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the first voltage stored in the device and replacing the first voltage stored in the device with the computed average value and going to Step f; otherwise, storing the first voltage stored in the device as the third voltage and replacing the first voltage stored in the device with the computed average value and going to Step f;

the setting voltage according to a second predetermined rule includes:

(1), determining whether the third voltage is collected, if yes, going to (2); otherwise storing the computed average value as the third voltage and going to Step f;

(2), comparing the computed average value with the third voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the third voltage stored in the device with the computed average value; if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, going to (3) subsequently; if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, going to (4);

(3), determining whether the second voltage is collected, if yes, replacing the second voltage stored in the device with the first voltage stored in the device and replacing the first voltage stored in the device with the computed average value and going to Step f; otherwise, storing the first voltage stored in the device as the second voltage and replacing the first voltage stored in the device with the computed average value and going to Step f; and

(4), determining whether the second voltage is collected, if yes, replacing the second voltage stored in the device with the first voltage stored in the device and replacing the first voltage stored in the device with the third voltage stored in the device and replacing the third voltage stored in the device with the computed average value and going to Step f; otherwise, storing the first voltage stored in the device as the second voltage and replacing the first voltage stored in the device with the third voltage stored in the device and replacing the third voltage stored in the device with the computed average value and going to Step f;

and the predetermined requirement is that both difference between the third voltage stored in the device and the first voltage stored in the device and difference between the first voltage stored in the device and the second voltage stored in the device are greater than a third predetermined voltage value.

In case that the device stores the first voltage, the second voltage and the third voltage in a high-to-low voltage value order of the first voltage, the second voltage and the third voltage, correspondingly, the setting voltage according to the first predetermined rule includes:

(1), determining whether the second voltage is collected, if yes, going to (2); otherwise, storing the computed average value as the second voltage and going to Step f;

(2), comparing the computed average value with the second voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the second voltage stored in the device with the computed average value; if difference between the two values is not smaller than the second voltage value and the later is greater, going to (3) subsequently; if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, going to (4);

(3), determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the computed average value, going to Step f; otherwise, storing the computed average value as the third voltage and going to Step f; and

(4), determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the second voltage stored in the device and replacing the second voltage stored in the device with the computed average value and going to Step f; otherwise, storing the second voltage stored in the device as the third voltage and replacing the second voltage stored in the device with the computed average value and going to Step f;

the setting voltage according to a second predetermined rule includes:

(1), determining whether the second voltage is collected, if yes, going to (2); otherwise, storing the first voltage stored in the device as the second voltage and replacing the first voltage stored in the device with the computed average value and going to Step f; and

(2), determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the second voltage stored in the device, replacing the second voltage stored in the device with the first voltage stored in the device, replacing the first voltage stored in the device with the

computed average value and going to Step f; otherwise, storing the second voltage stored in the device as the third voltage, replacing the second voltage stored in the device with the first voltage stored in the device, replacing the first voltage stored in the device with the computed average value and going to Step f;

and the predetermined requirement is that both difference between the first voltage stored in the device and the second voltage stored in the device and difference between the second voltage stored in the device and the third voltage stored in the device are greater than a third predetermined voltage value.

The device is configured with a partial self-adaptability flag and the partial self-adaptability flag is checked for in case of a successful self-adaptability;

if the partial self-adaptability is not set, the method includes:

(1), collecting voltage value, if the device stores the last collected voltage value, going to (2); otherwise, going to (3);

(2), comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (3); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer, quitting and waiting for next entering;

(3), adding the currently collected voltage value to the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches the first predetermined value, if yes, going to (4); otherwise, quitting and waiting for next entering;

(4), computing the average value of all voltage values stored in the voltage value buffer and determining whether the first voltage is collected, if yes, going to (5); otherwise, storing the computed average value as the first voltage and going to (6);

(5), comparing the computed average value with the first voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, setting voltage according to the first predetermined rule and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, setting voltage according to the second predetermined rule and going to (6);

(6), determining whether the first voltage, the second voltage and the third voltage are all collected, if yes, going to (7); otherwise, quitting and waiting for next entering;

(7), determining whether the first voltage, the second voltage and the third voltage stored in the device are all satisfied with the predetermined requirement, if yes, setting the partial self-adaptability flag, setting a time-out of the partial self-adaptability, quitting and the device waiting for receiving data; otherwise, going to (8); wherein the predetermined requirement is that among the first voltage, the second voltage and the third voltage, difference between the middle-valued voltage and the smallest-valued voltage and difference between the largest-valued voltage and the middle-valued voltage are all greater than a third predetermined voltage value; and

(8), determining whether the predetermined resistor-switching condition is satisfied with, if yes, checking for status of the current load resistor, switching into the next load resistor according to the predetermined rule, quitting, waiting for next entering and collecting voltage according to the next load resistor; otherwise, the self-adaptability being failed, quitting; wherein the predetermined resistor switching, condition is that times of switching the resistor does not reach the second predetermined value;

if the partial self-adaptability is set, the method includes:

(1), determining whether time-out of the partial self-adaptability is exceeded, if yes, the self-adaptability being failed and quitting; otherwise, collecting voltage value, and if the device stores the last collected voltage value, going to (2); otherwise, going to (3);

(2), comparing the currently collected voltage value with the last connected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (3); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer and going to (3);

(3), adding the currently collected voltage value to the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches the third predetermined value, if yes, going to (4); otherwise, quitting and waiting for next entering;

(4), computing the average value of all voltage values stored in the voltage value buffer, comparing the computed average value with the first voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to (7); otherwise, going to (5);

(5), comparing the computed average value with the second voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the second voltage stored in the device with the computed average value and going to (7), otherwise, going to (6);

(6), comparing the computed average value with the third voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage to value, replacing the third voltage stored in the device with the computed average value and going to (7); otherwise, discarding the computed average value, quitting and waiting for next entering;

(7), determining whether the first voltage, the second voltage and the third voltage are all collected, if yes, going to (8); otherwise, quitting and waiting for next entering;

(8), determining whether the first voltage, the second voltage and the third voltage stored in the device are all satisfied with the predetermined requirement, if yes, quitting and the device waiting for receiving data; otherwise, going to (9); wherein the predetermined requirement is that among the first voltage, second voltage and third voltage stored in the device, difference between the middle-valued voltage and the smallest-valued voltage and difference between the largest-valued voltage and the middle-valued voltage are both greater than a third predetermined voltage value; and

(9), determining whether the predetermined condition of switching resistor is satisfied with, if yes, checking for status of the current load resistor, switching into next load resistor according to the predetermined rule, quitting and waiting for next entering; otherwise, the self-adaptability being failed and quitting; in which the predetermined condition of switching resistor is that times of switching resistor does not reach a fourth predetermined value.

The device is configured with a flag of precisely collecting gray voltage, and if the self-adaptability is not failed, the method includes checking for the flag of precisely collecting gray voltage;

if the flag of precisely collecting gray voltage is not set, the method includes:

(1), collecting voltage value and if the device stores the last collected voltage value, going to (2); otherwise, going to (3);

(2), comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (3); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer and going to (3);

(3), storing the currently collected voltage value in the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches the first predetermined value, if yes, going to (4); otherwise, quitting and waiting for next entering;

(4), computing the average value of all voltage values stored in the voltage value buffer and determining whether the first voltage is collected, if yes, going to (5); otherwise, storing the computed average value as the first voltage and going to (6);

(5), comparing the computed average value with the first voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, setting voltage according to the first predetermined rule and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, setting voltage according to the second predetermined rule and going to (6);

(6), determining whether the first voltage, the second voltage and the third voltage are all collected, if yes, going to (7); otherwise, quitting and waiting for next entering;

(7), determining whether the first voltage, the second voltage and the third voltage stored in the device are all satisfied with the predetermined requirement, if yes, setting the flag of precisely collecting gray voltage, setting time-out of precisely collecting gray voltage, quitting and waiting for next entering; otherwise, going to (8); wherein the predetermined requirement is that among the first voltage, second voltage and third voltage stored in the device, difference between the middle-valued voltage and the smallest-valued voltage and difference between the largest-valued voltage and the middle-valued voltage are both greater than a third predetermined voltage value; and

(8), determining whether the predetermined condition of switching resistor is satisfied with, if yes, checking for status of the current load resistor, switching into next load resistor according to the predetermined rule, quitting, waiting for next entering and collecting voltage according to the next load resistor; otherwise, the self-adaptability being failed and quitting; wherein the predetermined condition of switching resistor is that times of switching resistor does not reach the second predetermined value;

if the flag of precisely collecting gray voltage is set, the method includes:

(1), determining whether time-out of precisely collecting gray voltage is reached, if yes, the self-adaptability being failed and quitting; otherwise, going to (2);

(2), collecting voltage value and determining whether difference between the currently collected voltage value and a predetermined voltage stored in the device is smaller than a fourth predetermined voltage value, if yes, going to (3); otherwise, quitting and waiting for next entering; wherein the predetermined voltage stored in the device is the middle-valued voltage among the first voltage, the second voltage and the third voltage stored in the device;

(3), if the device stores the last collected voltage value, going to (4); otherwise, going to (5);

(4), comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (5); otherwise, replacing the voltage value last collected by the device with the currently collected voltage value, clearing the voltage value buffer and going to (5);

(5), storing the currently collected voltage value in the voltage value buffer and determining, whether number of voltage values stored in the voltage value buffer reaches a fifth predetermined value, if yes, going to (6); otherwise, quitting and waiting for next entering; and

(6), computing the average value of all voltage values stored in the voltage value buffer, replacing predetermined voltage stored in the device with the computed average value, resetting the flag of precisely collecting gray voltage and quitting, the device waiting for receiving data.

The device sets a partial self-adaptability flag and a flag of precisely collecting gray voltage and in case that the self-adaptability is not failed, the method includes checking for the flag of precisely collecting gray voltage,

if the flag of precisely collecting gray voltage is set, the method includes:

(1), determining whether time-out of precisely collecting gray voltage is reached, if yes, the self-adaptability being failed and quitting; otherwise, going to (2);

(2), collecting voltage value and determining whether difference between the currently collected voltage value and the predetermined voltage stored in the device is smaller than a fourth predetermined voltage value, if yes, going to (3); otherwise, quitting and waiting for next entering, wherein the predetermined voltage stored in the device is a middle-value voltage among the first voltage, the second voltage and the third voltage stored in the device;

(3), if the device stores the last collected voltage value, going to (4); otherwise, going to (5);

(4), comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (5); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer and going to (5);

(5), storing the currently collected voltage value in the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches a fifth predetermined value, if yes, going to (6); otherwise, quitting and waiting for next entering; and

(6), computing the average value of all voltage values stored in the voltage value buffer, replacing the predetermined voltage stored in the device with the computed average value, resetting the flag of precisely collecting gray voltage and quitting, the device waiting for receiving data;

in case that the flag of precisely collecting gray voltage is not set, the method includes checking for the part self-adaptability flag,

in case that the flag of precisely collecting gray voltage is set, the method includes:

(1), determining whether time-out of the partial self-adaptability is reached, if yes, the self-adaptability being failed, quitting and waiting for next entering; otherwise, collecting voltage value and if the device stores the last collected voltage value, going to (2); otherwise, going to (3);

(2), comparing the currently collected voltage value with the last collected voltage value, if difference between the two

values is smaller than the first predetermined voltage value, going to (3); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer and going to (3);

(3), storing the currently collected voltage value in the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches the third predetermined value, if yes, going to (4); otherwise, quitting and waiting for next entering;

(4), computing the average value of all voltage values stored in the voltage value buffer, comparing the computed average value with the first voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to (7); otherwise, going to (5);

(5), comparing the computed average value with the second voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the second voltage stored in the device with the computed average value and going to (7); otherwise, going to (6);

(6), comparing the computed average value with the third voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the third voltage stored in the device with the computed average value and going to (7); otherwise, discarding the computed average value, quitting and waiting for next entering;

(7), determining whether the first voltage, second voltage and third voltage is all collected, if yes, going to (8); otherwise, quitting and waiting for next entering;

(8), determining whether the first voltage, the second voltage and the third voltage stored in the device are all satisfied with the predetermined requirement, if yes, quitting and waiting for next entering; otherwise, going to (9); and

(9), determining whether the predetermined condition of switching resistor is satisfied with, if yes, checking for status of the current load resistor, switching into next load resistor according to the predetermined rule, quitting and waiting for next entering; otherwise, setting the self-adaptability failure flag and quitting; wherein the predetermined resistor switching condition is that times of switching resistor does not reach a fourth predetermined value;

in case that the part self-adaptability flag is not set, the method includes:

(1) collecting voltage value and if the device stores the last collected voltage value, going to (2); otherwise, going to (3);

(2), comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (3); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer, quitting and waiting for next entering;

(3), storing the currently collected voltage value in the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches the first predetermined value, if yes, going to (4); otherwise, quitting and waiting for next entering;

(4), computing the average value of all voltage values stored in the voltage value buffer and determining whether the first voltage is collected, if yes, going to (5); otherwise, storing the computed average value as the first voltage and going to (6);

(5), comparing the computed average value with the first voltage stored in the device and if difference between the two values is smaller than the second predetermined voltage value, replacing the first voltage value stored in the device with the computed average value and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, setting voltage according to the first predetermined rule and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, setting voltage according to the second predetermined rule and going to (6);

(6), determining whether the first voltage, the second voltage and the third voltage are all collected, if yes, going to (7); otherwise, quitting and waiting for next entering;

(7), determining whether the first voltage, the second voltage and the third voltage are all satisfied with the predetermined requirement, if yes, setting the partial self-adaptability flag and the flag of precisely collecting gray voltage, setting the time-out of the part self-adaptability and the time-out of the precisely collecting gray voltage and quitting, the device waiting for receiving data; otherwise, going to (8); wherein the predetermined requirement is that among the first voltage, second voltage and third voltage, difference between the middle-valued voltage and the smallest-valued voltage and difference between the largest-valued voltage and the middle-valued voltage is both greater than a third predetermined voltage value; and

(8), determining whether the predetermined condition of switching resistor is satisfied with, if yes, checking for status of the current load resistor, switching into next load resistor according to the predetermined rule, quitting and waiting for next entering and collecting voltage according to the next load resistor; otherwise, the self-adaptability being failed and quitting; wherein the predetermined condition of switching resistor is that times of switching resistor does not reach the second predetermined value.

The predetermined condition is detecting timer interruption, in which the timer interruption is started when the device receives a self-adaptability request and is closed when the self-adaptability is completed or is failed, or when precise collection of gray voltage is completed.

The device is deployed with five-level load resistors which are identified as HH, H, M, L and LL in order of high-to-low resistance;

the device controls conducting the load resistor M upon receiving the self-adaptability request;

the predetermined rule is cycle switching, in an order of M-L-LL-H-HH or cycle switching in an order of M-L-H-LL-HH.

The self-adaptability failure flag is configured to determine whether the self-adaptability is failed and if the self-adaptability failure flag is set, the self-adaptability is identified as failure;

a flag of the first voltage having been collected is configured to determine whether the first voltage has been collected and if the flag of the first voltage having been collected is set, the first voltage is identified as having been collected;

a flag of the second voltage having been collected is configured to determine whether the second voltage has been collected and if the flag of the second voltage having been collected is set, the second voltage is identified as having been collected;

a flag of the third voltage having been collected is configured to determine whether the third voltage has been collected and if the flag of the third voltage having been collected is set, the third voltage is identified as having been collected;

The invention has advantages of improving luminous intensity adaptability of a screen and reducing rate of error codes when collecting optical signal.

BRIEF DESCRIPTION OF THE DRAWINGS

For clarifying the embodiments of the invention or technical solution of prior art, a simple description will be taken of the drawings used in the embodiments and the prior art as below. Obviously, the below-mentioned drawings are just examples of the invention. A common person skill in the art will obtain other drawings according to the provided drawings without involving an inventive effort.

FIGS. **1**-**4**, **5**-*a*, **5**-*b*, **6**-*a*, **6**-*b* and **7** are flow charts of a method for improving luminous intensity adaptability provided by Embodiment 1 of the invention;

FIGS. **8**-*a* to **8**-*d* are flow charts of a complete self-adaptability method provided by Embodiment 2 of the invention;

FIGS. **9**-*a* and **9**-*b* are flow charts of a complete self-adaptability method provided by Embodiment 3 of the invention;

FIGS. **10**-*a* and **10**-*b* are flow charts of a complete self-adaptability method provided by Embodiment 4 of the invention;

FIGS. **11**-*a* and **11**-*b* are flow charst of a partial self-adaptability method provided by Embodiment 5 of the invention;

FIG. **12** is a flow chart of a method of precisely collecting gray voltage provided by Embodiment 6 of the invention; and

FIG. **13** is a diagram of a device of improving luminous intensity adaptability provided by Embodiment 7 of the invention.

DETAILED DESCRIPTION OF THE INVENTION

A clear and complete description will be taken of the solution of embodiments of the invention in conjunction with drawings of embodiments of the invention. Obviously, the described embodiments are just part of embodiments of the invention, not the whole embodiments. Based on embodiments of the invention, all other embodiments obtained by a person skill in the art without involving an inventive effort should fall within the scope of protection of the invention.

Embodiment 1

In order to improve luminous intensity adaptability of an optical signal collecting device during collecting optical signal, a method for improving luminous intensity adaptability of a screen during collecting optical signal is provided according to the embodiment of the invention. In the method, the device controls a predetermined load resistor to conduct upon receiving a self-adaptability request, as shown in FIG. **1**, and the following steps are executed each time the device detects that a predetermined condition is satisfied with.

Step **101**, determining whether self-adaptability is failed, if yes, restoring modifications on flags, variables and load resistors made by the device, prompting error and shutting down the device; otherwise, the device performing complete self-adaptability of the device, specifically the complete self-adaptability being executed in Steps **102-1** to **102-8**.

As shown in FIGS. **2** to **4**, Step **101** can be replaced with Step **101'** or Step **101"** or Step **101"'**.

Step **101'**, determining whether self-adaptability is failed, if yes, restoring modifications on flags, variables and load resistors made by the device and prompting error and shutting down device; otherwise, checking for partial self-adaptability flag, if the partial self-adaptability flag is set, performing partial self-adaptability by executing Steps **103-1** to **103-9**; if the flag is not set, performing complete self-adaptability by executing. Steps **102-1** to **102-8**.

It is noted that Step **102-7** can be replaced with Step **102-7'** which includes determining whether first voltage, second voltage and third voltage stored in the device are satisfied with predetermined requirement, if yes, setting time-out of the partial self-adaptability flag and quitting; and the device waiting for receiving data otherwise executing Step **102-8**.

Step **101"**, determining whether self-adaptability is failed, if yes, restoring modifications on flags, variables and load resistors made by the device, prompting error and shutting down the device; otherwise checking for a flag of precisely collecting gray voltage, if the flag is set, precisely collecting the gray voltage by executing Steps **104-1** to **104-6**; if the flag is not set, the device performing complete self-adaptability by executing Steps **102-1** to **102-8**.

It is noted that Step **102-7** can be replaced with Step **102-7"** which includes determining whether first voltage, second voltage and third voltage stored in the device are satisfied with predetermined requirement, if yes, setting the flag of precisely collecting gray voltage and setting time-out of the precisely collecting gray voltage, quitting and the device waiting for receiving data; otherwise executing Step **102-8**.

Step **101"'**, determining, whether self-adaptability is failed, if yes, restoring, modifications on flags, variables and load resistors made by the device, prompting error and shutting down the device; otherwise, checking for the flag of precisely collecting gray voltage, if the flag is set, the device performing precisely collecting gray voltage by executing Steps **104-1** to **104-6**; if the flag is not set, checking whether the partial self-adaptability flag is set, and if yes, the device performing partial self-adaptability by executing Steps **103-1** to **103-9**; otherwise, the device performing complete self-adaptability by executing Steps **102-1** to **102-8**.

It is noted that Step **103-8** can be replaced with Step **103-8'** and Step **102-7** can be replaced with Step **102-7"'**.

Step **103-8'**, determining whether the first voltage, the second voltage and the third voltage stored in the device are satisfied with predetermined requirement, if yes, quitting and waiting for next entering; otherwise, executing Step **103-9**.

Step **102-7"'**, determining whether the first voltage, the second voltage and the third voltage stored in the device are satisfied with predetermined requirement, if yes, setting the partial self-adaptability flag and the flag of precisely collecting gray voltage, setting time-out of the partial self-adaptability and time-out of the precisely collecting gay voltage and quitting, the device waiting for receiving data otherwise executing Step **102-8**.

As shown in FIGS. **5**-*a* and **5**-*b*, Steps **102-1** to **102-8** include following steps.

Step **102-1**, collecting voltage value and determining whether a last collected voltage value is stored in the device, if yes, going to Step **102-2**; otherwise, going to Step **102-3**.

Step **102-2**, comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than a first predetermined voltage value, going to Step **102-3**; otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing a voltage value buffer and going to Step **102-3**.

Step **102-3**, storing the currently collected voltage value into the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches a first predetermined value, if yes, going to Step **102-4**; otherwise, quitting and waiting for next entering.

Step **102-4**, computing an average value of all voltage values stored in the voltage value buffer and determining whether the first voltage is collected, if yes, going to Step **102-5**; otherwise, storing the computed average value as first voltage and going to Step **102-6**.

Step **102-5**, comparing the computed average value with the first voltage stored in the device, if difference between the

two values is smaller than a second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to Step **102-6**; if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, setting voltage according to a first predetermined rule and going to Step **102-6**; if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, setting voltage according to a second predetermined rule and going to Step **102-6**.

Step **102-6**, determining whether all of first voltage, second voltage and third voltage are collected, if yes, going to Step **102-7**; otherwise, quitting and waiting for the next entering.

Step **102-7**, determining whether first voltage, second voltage and third voltage stored in the device are satisfied with predetermined requirement, if yes, quitting and the device waiting for receiving data; otherwise, going to Step **102-8**.

Step **102-8**, determining whether a predetermined resistor-switching condition is reached, if yes, checking for status of a current load resistor, switching into a next load resistor according to a predetermined rule, quitting and waiting for next entering and collecting voltage according to the next load resistor; otherwise, considering that the self-adaptability is failed, clearing the first voltage, second voltage, and third voltage stored in the device and quitting.

As shown in FIGS. **6**-*a* and **6**-*b*, Steps **103-1** to **103-9** include the following steps.

Step **103-1**, determining whether the time-out of the partial self-adaptability is reached, if yes, considering that the self-adaptability is failed and quitting; otherwise, collecting voltage value and determining whether the last collected voltage value is stored in the device, if yes, going; to Step **103-2**; otherwise, directly going to Step **103-3**.

Step **103-2**, comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to Step **103-3**; otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer and going to Step **103-3**.

Step **103-3**, storing the currently collected voltage value into the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches the first predetermined value, if yes, going to Step **103-4**; otherwise, quitting and waiting for next entering.

Step **103-4**, computing an average value of all voltage values stored in the voltage value buffer and comparing the computed average value with the first voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to Step **103-7**; otherwise going to Step **103-5**.

Step **103-5**, comparing the computed average value with the second voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the second voltage stored in the device with the computed average value and going to Step **103-7**; otherwise, going to Step **103-6**.

Step **103-6**, comparing the computed average value with a third voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the third voltage stored in the device with the computed average value and going to Step **103-7**; otherwise discarding the computed average value, quitting and waiting for next entering.

Step **103-7**, determining whether all of the first voltage, second voltage and third voltage are collected, if yes, going to Step **103-8**; otherwise quitting and waiting for next entering.

Step **103-8**, determining whether the first voltage, second voltage and third voltage stored in the device are satisfied with predetermined requirement, if yes, quitting and the device waiting for receiving data; otherwise, going to Step **103-9**.

Step **103-9**, determining whether the predetermined resistor switching condition is satisfied with, if yes, checking for status of the current load resistor, switching into a next load resistor according to a predetermined rule, quitting and waiting for next entering and collecting voltage according to the next load resistor; otherwise determining that the self-adaptability is failed and quitting.

As shown in FIG. **7**, Steps **104-1** to **104-5** include the following steps.

Step **104-1**, determining whether the time-out of the precisely collecting gray voltage is reached, if yes, considering that the self-adaptability is failed and quitting; otherwise going to Step **104-2**.

Step **104-2**, collecting a voltage value and determining whether difference between the currently collected voltage value and predetermined voltage stored in the device is smaller than a fourth predetermined voltage value, if yes, going to Step **104-3**; otherwise, quitting and waiting for next entering.

The predetermined voltage stored in the device is middle-valued voltage among the first voltage, the second voltage and the third voltage stored in the device.

Step **104-3**, determining whether the last collected voltage value is stored in the device, if yes, going to Step **104-4** otherwise, going to Step **104-5** directly.

Step **104-4**, comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to Step **104-5**; otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer and going to Step **104-5**.

Step **104-5**, storing the currently collected voltage value into the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches a third predetermined value, if yes, going to Step **104-6**; otherwise, quitting and waiting for next entering.

Step **104-6**, computing an average value of all voltage values stored in the voltage value buffer, replacing the predetermined voltage stored in the device with the computed average value, setting the flag of precisely collecting gray voltage and quitting, and the device waiting for receiving data.

Preferably in the embodiment:

the predetermined condition can be, but not limited to, the time when a timer interruption is detected;

the self-adaptability failure flag identifies whether self-adaptability is failed and the flag being set identifies a failed self-adaptability; a flag of the first voltage having been collected identifies whether the first voltage has been collected and the flag being set identifies that the first voltage has been collected; a flag of the second voltage having been collected identifies whether the second voltage has been collected and the flag being set identifies that the second voltage has been collected; a flag of the third voltage having been collected identifies whether the third voltage has been collected and the flag being set identifies that the third voltage has been collected; and obviously, other methods can be used to identify and details of them are omitted; and

five-level load resistors are deployed in the device, which are identified as HH, H, M, L and LL in order of high-to-low resistance; the device conducts load resistor M upon receiving a self-adaptability request; the predetermined rule includes cycle switching in an order of M-L-LL-H-HH or cycle switching in an order of M-L-H-LL-HH; more load resistors can be deployed in the device, and the initially conducting load resistor and switching order can be set with the same method.

Embodiment 2

As shown in FIGS. **8**-*a*, **8**-*b*, **8**-*c*, and **8**-*d*, the embodiment of the invention provides a complete self-adaptability method performed by a device. The method includes the following steps.

Step **201**, collecting a voltage value and determining whether a last collected voltage value is stored in the device, if yes, going to Step **202** subsequently; otherwise storing a currently collected voltage value as the last collected voltage value and going to Step **204**.

Specifically in the embodiment, the step of collecting a voltage value includes that the device converts signal collected from its screen into electrical signal via a sensor and converts the electrical signal into a digital value, namely a voltage value, via an AD converter.

Step **202**, determining whether difference between the currently collected voltage value and the last collected voltage value stored in the device is smaller than a predetermined voltage value, if yes, going to Step **204**; otherwise, going to Step **203** subsequently.

Step **203**, replacing the last collected voltage value stored in the device with the currently collected voltage value, clearing a voltage value buffer and quitting the self-adaptability function.

Step **204**, storing the currently collected voltage value in the voltage value buffer.

Step **205**, determining whether number of voltage values stored in the voltage value buffer reaches a predetermined value, if yes, going to Step **206** subsequently; otherwise quitting the self-adaptability function.

Preferably, a variable of times is setup in the device. Besides the step of storing the currently collected voltage value in the voltage value buffer, Step **204** further includes: updating the variable of times as the current variable of times plus 1; besides the step of clearing the voltage value buffer, Step **203** further includes: setting the variable of times to be 0; and the step of determining whether number of the voltage values stored in the voltage value buffer reaches a predetermined value in Step **205** specifically includes: determining whether variable of times is smaller than a predetermined value.

Step **206**, computing an average value of all voltage values stored in the voltage value buffer.

Step **207**, checking for a flag of black voltage having been collected is set, if yes, going to Step **209**; otherwise, going to Step **208** subsequently.

Step **208**, storing the computed average value as black voltage and setting the flag of black voltage having been collected and going to Step **228**.

Step **209**, determining whether difference between the computed average value and the current stored black voltage is smaller than a predetermined voltage value, if yes, going to Step **210** subsequently; otherwise, going to Step **211**.

Step **210**, replacing the currently stored black voltage with the computed average value and going to Step **228**.

Step **211**, determining whether the computed average value is greater than the currently stored black voltage, if yes, going to Step **217** otherwise, going to Step **212** subsequently.

Step **212**, checking for whether as flag of gray voltage having been collected is set, if yes, going to Step **214**; otherwise, going to Step **213** subsequently.

Step **213**, storing the currently stored black voltage as the gray voltage, setting the flag of the gray voltage having been collected, replacing the currently stored black voltage with the computed average value and going to Step **228**.

Step **214**, checking for whether a flag of white voltage having been collected is set, if yes, going to Step **216**; otherwise, going to Step **215** subsequently.

Step **215**, storing the currently stored gray voltage as white voltage and setting flag of white voltage having been collected, replacing the currently stored gray voltage with the currently stored black voltage, replacing the currently stored black voltage with the computed average value and going to Step **228**.

Step **216**, replacing the currently stored white voltage with the currently stored gray voltage, replacing the currently stored gray voltage with the currently stored black voltage, replacing the currently stored black voltage with the computed average value and going to Step **228**.

Step **217**, checking for whether the flag of gray voltage having been collected is set, if yes, going to Step **219**; otherwise, going to Step **218** subsequently.

Step **218**, storing the computed average value as gray voltage, setting the flag of gray voltage having been collected and going to Step **228**.

Step **219**, determining whether difference between the computed average value and the currently stored gray voltage is smaller than a predetermined voltage value, if yes, going to Step **220**; otherwise, going to Step **221**.

Step **220**, replacing the currently stored gray voltage with the computed average value and going to Step **228**.

Step **221**, determining whether the computed average value is greater than the currently stored gray voltage, if yes, going to Step **225**; otherwise, going to Step **222** subsequently.

Step **222**, checking for whether the flag of white voltage having been collected is set, if yes, going to Step **224**; otherwise, going to Step **223** subsequently.

Step **223**, storing the currently stored gray voltage as white voltage, setting the flag of white voltage having been collected, replacing the currently stored gray voltage with the computed average value and going to Step **228**.

Step **224**, replacing the currently stored white voltage with the currently stored gray voltage, replacing the currently stored gray voltage with the computed average value and going to Step **228**.

Step **225**, checking for whether the flag of white voltage having been collected is set, if yes, going to Step **227**; otherwise, going to Step **226** subsequently.

Step **226**, storing the computed average value as white voltage, setting the flag white voltage having been collected and going to Step **228**.

Step **227**, replacing the currently stored white voltage with the computed average value and going to Step **228**.

Step **228**, determining whether the flag of black voltage having been collected, the flag of gray voltage having been collected and the flag of white voltage having been collected are all set, if yes, going to Step **229** subsequently; otherwise, quitting self-adaptability function.

Step **229**, determining whether difference between the currently stored white voltage and the gray voltage, and difference between the gray voltage and the black voltage are both greater than a predetermined voltage value, if yes, quitting the self-adaptability function; otherwise going to Step **230** subsequently.

If the device is deployed with a partial self-adaptability capability, and if the difference between the currently stored white voltage and the gray voltage and difference between the gray voltage and the black voltage are both greater than a predetermined voltage value, then the step further includes: setting the partial self-adaptability flag, resetting a flag of first voltage having been collected, a flag of second voltage having been collected and a flag of third voltage having been collected, and setting time-out of self-adaptability.

If the device has a function of precisely collecting gray voltage, and if difference between the currently stored white voltage and the gray voltage and difference between the gray voltage and the black voltage are both greater than a predetermined voltage value, then the step further includes: setting a flag of precisely collecting gray voltage and setting time-out of the precisely collecting gray voltage.

If the device has both function of partial self-adaptability and function of precisely collecting gray voltage, and if difference between the currently stored white voltage and gray voltage and difference between the gray voltage and black voltage are both greater than a predetermined voltage value, then the step further includes: setting the partial self-adaptability flag and the flag of precisely collecting gray voltage, resetting the flag of the first voltage having been collected, the flag of the second voltage having been collected and the flag of the third voltage having been collected, and setting time-out of the part self-adaptability and time-out of precisely collecting gray voltage.

Step **230**, determining whether the maximum collecting time is reached, if yes, going to Step **231** subsequently; otherwise, quitting the self-adaptability function.

Specifically in the embodiment, whether the maximum collecting time is reached is determined by the timer.

Step **231**, updating a variable of times of switching resistor and determining whether the updated variable of times of switching resistor is greater than a number of predetermined times, if yes, setting the self-adaptability failure flag and clearing the currently stored black voltage, gray voltage and white voltage, quitting the self-adaptability function; otherwise going to Step **232** subsequently.

Specifically in the embodiment, the step of updating the variable of times of switching the load resistor includes: updating the variable of times of switching the load resistor as the current variable of times of switching the load resistor plus **1**.

Step **232**, checking for status of the load resistor, switching the load resistor according to a predetermined rule and quitting the self-adaptability function.

Preferably in the embodiment, five-level load resistors are configured in the device, which are identified as HH, M, L and LL in order of high-to-low resistance. When the device is initialized, the load resistor M is set to be conducted, and then a cycle switching in an order of M-L-LL-H-HH or in an order of M-L-H-LL-HH is performed, which is not limited herein.

Embodiment 3

As shown in FIGS. **9**-*a* and **9**-*b*, a complete self-adaptability method performed by a device is provided in the embodiment of the invention. The method includes the following steps.

Steps **301**-**306** are the same as Steps **201**-**206** and therefore are omitted herein.

Step **307**, checking for whether a flag of white voltage having been collected is set, if yes, going to Step **309**; otherwise, going to Step **308** subsequently.

Step **308**, storing the computed average value as white voltage, setting the flag of white voltage having been collected and going to Step **328**.

Step **309**, determining whether difference between the computed average value and the currently stored white voltage is smaller than a predetermined value, if yes, going to Step **310** subsequently; otherwise, going to Step **311**.

Step **310**, replacing the currently stored white voltage with the computed average value and going to Step **328**.

Step **311**, determining whether the computed average value is greater than the currently stored white voltage, if yes, going to Step **312** subsequently; otherwise, going to Step **317**.

Step **312**, checking for whether a flag of gray voltage having been collected is set, if yes, going to Step **314**; otherwise, going to Step **313** subsequently.

Step **313**, storing the currently stored white voltage as gray voltage, setting the flag of gray voltage having been collected, replacing the currently stored white voltage with the computed average value and going to Step **328**.

Step **314** checking for whether a flag of black voltage having been collected is set, if yes, going to Step **316**; otherwise, going to Step **315** subsequently.

Step **315**, storing the currently stored gray voltage as black voltage, setting the flag of black voltage having been collected, replacing the currently stored gray voltage with the currently stored white voltage, replacing the currently stored white voltage with the computed average value and going to Step **328**.

Step **316**, replacing the currently stored black voltage with the currently stored gray voltage, replacing the currently stored gray voltage with the currently stored white voltage, replacing the currently white voltage with the computed average value and going to Step **328**.

Step **317**, checking for whether a flag of gray voltage having been collected is set, if yes, going to Step **319**; otherwise, going to Step **318** subsequently.

Step **318**, storing the computed average value as gray voltage, setting the flag of the gray voltage having been collected and going to Step **328**.

Step **319**, determining whether difference between the computed average value and the currently stored gray voltage is smaller than predetermined voltage value, if yes, going to Step **320** subsequently; otherwise, going to Step **321**.

Step **320**, replacing the currently stored gray voltage with the computed average value and going to Step **328**.

Step **321**, determining whether the computed average value is greater than the currently stored gray voltage, if yes, going to Step **322** subsequently; otherwise, going to Step **325**.

Step **322**, checking for whether the flag of black voltage having been collected is set, if yes, going to Step **324**, otherwise, going to Step **323** subsequently.

Step **323**, storing the currently stored gray voltage as black voltage and setting the flag of the black voltage having been collected, replacing the currently stored gray voltage with the computed average value and going to Step **328**.

Step **324**, replacing the currently stored black voltage with the currently stored gray voltage, replacing the currently stored gray voltage with the computed average value and going to Step **328**.

Step **325**, checking for whether the flag of black voltage having been collected is set, if yes, going to Step **327**; otherwise, going to Step **326**.

Step **326**, storing the computed average value as black voltage, setting the flag of the black voltage having been collected and going to step **328**.

Step **327**, replacing the currently stored black voltage with the computed average value and going to Step **328**.

Steps **328**-**332** are the same as Steps **228**-**232** and are omitted herein.

Embodiment 4

As shown in FIGS. **10**-*a* and **10**-*b*, a complete self-adaptability method performed by a device is provided in the embodiment of the invention. The method includes the following steps.

Steps **401**-**406** are the same as Steps **201**-**206** and therefore are omitted herein.

Step **407**, checking for whether a flag of gray voltage having been collected is set, if yes, going to Step **409**; otherwise, going to Step **408** subsequently.

Step **408**, storing the computed average value as gray voltage, setting a flag of gray voltage having been collected and going to Step **434**.

Step **409**, determining whether difference between the computed average value and the currently stored gray voltage is smaller than a predetermined voltage value, if yes, going to Step **410** subsequently; otherwise, going to Step **411**.

Step **410**, replacing the currently stored gray voltage with the computed average value and going to Step **434**.

Step **411**, determining whether the computed average value is greater than the currently stored gray voltage, if yes, going to Step **423**; otherwise, going to Step **412** subsequently.

Step **412**, checking for whether the flag of black voltage having been collected is set, if yes, going to Step **414**; otherwise, going to Step **413** subsequently.

Step **413**, storing the computed average value as black voltage, setting the flag of black voltage having been collected and going to Step **434**.

Step **414**, determining whether difference between the computed average value and the currently stored black voltage is smaller than a predetermined voltage, if yes, going to Step **415** subsequently; otherwise, going to Step **416**.

Step **415**, replacing the currently stored black voltage with the computed average value, and going to Step **434**.

Step **416**, determining whether the computed average value is greater than the currently stored black voltage, if yes, going to Step **420**; otherwise, going to Step **417** subsequently.

Step **417**, checking for whether flag of white voltage having been collected is set, if yes, going to Step **419**; otherwise, going to Step **418** subsequently.

Step **418**, storing the currently stored gray voltage as white voltage and setting the flag of white voltage having been collected, replacing the currently stored gray voltage with the currently stored black voltage and replacing the currently stored black voltage with the computed average value and going to Step **434**.

Step **419**, replacing the currently stored white voltage with the currently stored gray voltage, replacing the currently stored gray voltage with the currently stored black voltage, replacing the currently stored black voltage with the computed average value and going to Step **434**.

Step **420**, checking for whether flag of white voltage having been collected is set, if yes, going to Step **422**; otherwise, going to Step **421** subsequently.

Step **421**, storing the currently stored gray voltage as white voltage and setting the flag of white voltage having been collected, replacing the currently stored gray voltage with the computed average value and going to Step **434**.

Step **422**, replacing the currently stored white voltage with the currently stored gray voltage, replacing the currently gray voltage with the computed average value and going to Step **434**.

Step **423** checking for whether flag of white voltage having been collected is set, if yes, going to Step **425**; otherwise, going to Step **424** subsequently.

Step **424**, storing the computed average value as white voltage and setting the flag of white voltage having been collected and going to Step **434**.

Step **425**, determining whether difference between the computed average value and the currently stored white voltage is smaller than a predetermined voltage value, if yes, going to Step **426** subsequently; otherwise, going to Step **427**.

Step **426**, replacing the currently stored white voltage with the computed average value and going to Step **434**.

Step **427**, determining whether the computed average value is greater than the currently stored white voltage, if yes, going to Step **428** subsequently; otherwise, going to Step **431**.

Step **428**, checking for whether flag of black voltage having been collected is set, if yes, going to Step **430**; otherwise going to Step **429**.

Step **429**, storing the currently stored gray voltage as black voltage and setting flag of the black voltage having been collected, replacing the currently stored gray voltage with the currently stored white voltage, replacing the currently stored white voltage with the computed average value and going to Step **434**.

Step **430**, replacing the currently stored black voltage with the currently stored gray voltage, replacing the currently stored gray voltage with the currently stored white voltage, replacing the currently stored white voltage with the computed average value and going to Step **434**.

Step **431**, checking for whether flag of black voltage having been collected is set, if yes, going to Step **433**; otherwise, going to Step **432** subsequently.

Step **432**, storing the currently stored gray voltage as black voltage, setting flag of black voltage having been collected, replacing the currently stored gray voltage with the computed average value and going to Step **434**.

Step **433**, replacing the currently store black voltage with the currently stored gray voltage, replacing the currently stored gray voltage with the computed average value and going to Step **434**.

Steps **434**-**438** are the same as Steps **228**-**232** and therefore are omitted herein.

Embodiment 5

As shown in FIGS. **11**-*a* and **11**-*b*, a partial self-adaptability method performed by a device is provided in the embodiment of the invention. In the method, the device determines whether the partial self-adaptability time-out is exceeded, if yes, a self-adaptability failure flag is set and a self-adaptability function is quit; otherwise, the following steps are executed.

Steps **501**-**506** are the same with Steps **201**-**206** and therefore are omitted herein.

Step **507**, determining whether difference between the computed average value and the currently stored black voltage is smaller than a predetermined voltage value, if yes, going to Step **508** subsequently; otherwise, going to Step **509**.

Step **508**, replacing the currently stored black voltage with the computed average value, setting flag of black voltage having been collected and going to Step **513**.

Step **509**, determining whether difference between the computed average value and the currently stored gray voltage is smaller than a predetermined voltage value, if yes, going to Step **510** subsequently; otherwise, going to Step **511**.

Step **510**, replacing the currently stored gray voltage with the computed average value, setting flag of gray voltage having been collected and going to Step **513**.

Step **511**, determining whether difference between the computed average value and currently stored white voltage is

smaller than a predetermined voltage value, if yes, going to Step **512** subsequently; otherwise, quitting the self-adaptability function.

Step **512**, replacing the currently stored white voltage with the computed average value, setting flag of white voltage having been collected and going to Step **513**.

Step **513**, determining whether flag of the black voltage having been collected, flag of gray voltage having been collected and flag of white voltage having been collected are all set, if yes, going to Step **514** subsequently; otherwise, quitting the self-adaptability function.

Step **514**, determining whether difference between the currently stored white voltage and gray voltage and difference between the gray voltage and the black voltage are both greater than a predetermined voltage value, if yes, quitting the self-adaptability function; otherwise, going to Step **515** subsequently.

If the device is configured with a flag of precisely collecting gray voltage and if difference between the currently stored white voltage and the gray voltage and difference between the currently stored gray voltage and the black voltage are both greater than a predetermined value, then the step further includes: setting the flag of precisely collecting the gray voltage and setting time-out of precisely collecting gray voltage.

Step **515**, determining whether a maximum collecting time is reached, if yes, going to Step **516** subsequently; otherwise, quitting the self-adaptability function.

Specifically in the embodiment, the maximum collecting time is determined by to timer.

Step **516**, updating a variable of times of switching resistor and determining whether the updated variable of times of switching resistor is greater than a predetermined value, if yes, setting the self-adaptability failure flag, clearing the currently stored black voltage, gray voltage and white voltage, quitting the self-adaptability function; otherwise, going to Step **517** subsequently.

Specifically in the embodiment, the step of updating the variable of times of switching load resistor includes: updating the variable of times of switching load resistor as the current variable of times of switching load resistor plus 1.

Step **517**, checking for status of the load resistor, switching the load resistor according to a predetermined rule and quitting the self-adaptability function.

Preferably in the embodiment, the device is configured with five-level load resistors which are identified as HH, H, M, L, LL in order of high-to-low resistance. When the device is initialized, the load resistor M is set to be conducted and a cycle switching in an order of M-L-LL-H-HH or in an order of M-L-H-LL-HH is performed, which is not limited herein.

In the embodiment, the comparing order of the computed average value with the black voltage, gray voltage and white voltage currently stored in the device is not limited.

Embodiment 6

As shown in FIG. **12**, a method of precisely collecting gray voltage performed by a device is provided in the embodiment of the invention. In the method, the device determines whether time-out of precisely collecting gray voltage is reached, if yes, a self-adaptability failure flag is set and a self-adaptability function is quit; otherwise, the following steps are executed.

Step **601**, collecting voltage value.

Specifically in the embodiment, the step of collecting voltage value includes that the device converts optical signal collected from its screen into electrical signal via a sensor and converts the electrical signal into a digital number, i.e. a voltage value, via an AD converter.

Step **602**, determining whether the currently collected voltage value is within a predetermined range of the currently stored gray voltage, if yes, going to Step **604**; otherwise, going to Step **603** subsequently.

Specifically, the step of determining whether the currently collected voltage value is within a predetermined range of the currently stored gray voltage includes: determining difference between the currently collected voltage value and the currently stored gray voltage is smaller than a predetermined voltage value, if yes, considering that the currently collected voltage value is within the predetermined range of the gray voltage; otherwise, considering the currently collected voltage value is not within the predetermined range of the gray voltage.

Step **603**, clearing a voltage value buffer and quitting a self-adaptability function.

Step **604**, determining whether a last collected voltage value is stored in the device, if yes, going to Step **605**; otherwise, storing, the currently collected voltage value as last collected voltage value and going to Step **607**.

Step **605**, determining whether difference between the currently collected voltage value and the last collected voltage value stored in the device is smaller than a predetermined voltage value, if yes, going to Step **607**; otherwise, going to Step **606** subsequently.

Step **606**, replacing the last collected voltage value stored in the device with the currently collected voltage value, clearing the voltage value buffer and going to Step **607**.

Step **607**, storing the currently collected voltage value into the voltage value buffer.

Step **608**, determining whether number of voltage values stored in the voltage value buffer reaches a predetermined value, if yes, going to Step **609**; otherwise, quitting the self-adaptability function.

Preferably, the device is configured with a variable of times, and the step of storing the currently collected voltage value into the voltage value buffer in Step **607** further includes: updating the variable of times to be the current variable of times plus **1**, and the step of clearing the voltage value buffer in Steps **603**, **606** and **610** further includes: setting the variable of times to be **0**; and the step of determining whether number of voltage values stored in the voltage value buffer reaches a predetermined value in Step **608** specifically includes: determining whether the variable of times is not smaller than the predetermined value.

Step **609**, computing an average value of all voltage values stored in the voltage value buffer and replacing the currently stored gray voltage with the computed average value.

Step **610**, resetting the flag of precisely collecting gray voltage, clearing the voltage value buffer, setting time-out of receiving optical data and quitting the self-adaptability function.

Embodiment 7

In order to improve luminous intensity adaptability during collecting optical signal by a screen of an optical signal collecting device, a device of improving luminous intensity adaptability during a screen collects optical signal is provided in the embodiment of the invention. As shown in FIG. **13**, the device includes a receiving module **701**, a controlling module **702**, a optical module **703**, a load module **704** and a power module **705**. Functions of the modules are discussed as below.

The receiving module **701** is configured to receive a request of self-adaptability.

The controlling module **702** is configured to

control initializing the device when the receiving module **701** receives the self-adaptability request, and detect whether the device is satisfied with a condition of entering self-adapt-

ability function entry upon finishing initialization, and in case that the device is satisfied with the condition, detect a self-adaptability failure flag, and in case that the self-adaptability failure flag is set, set variables and flags having been modified in process of self-adaptability to be initial values or initial status, prompt error and control shutting off the device; and in case that the self-adaptability failure flag is not set, perform complete self-adaptability;

or control initializing the device when the receiving module **701** receives the self-adaptability request, and to detect whether the device is satisfied with a condition of entering the self-adaptability function entry upon finishing initialization, and in case that the device is satisfied with the condition, check for a self-adaptability failure flag, and in case that the self-adaptability failure flag is set, set variables and flags having been modified in process of self-adaptability to be initial values or initial status, prompt error and control shutting off the device; in case that the self-adaptability failure flag is not set, check for a flag of precisely collecting gray voltage, if the flag of precisely collecting gray voltage is set and time-out of precisely collecting gray voltage is not exceeded, precisely collect the gray voltage; if the flag of precisely collecting gray voltage is not set, perform complete self-adaptability;

or control initializing the device when the receiving module **701** receives the self-adaptability request and detect whether the device is satisfied with a condition of entering the self-adaptability function entry upon finishing initialization, and in case that the device is satisfied with the condition, detect a self-adaptability failure flag, and in case that the self-adaptability failure flag is set, set variables and flags haying been modified in process of is self-adaptability to be initial values or initial status, prompt error and control shutting off the device; in case that the self-adaptability failure flag is not set, detect a partial self-adaptability flag, if the partial self-adaptability is set and time-out of partial self-adaptability is reached, reset the partial self-adaptability flag and perform complete self-adaptability setting and perform the complete self-adaptability upon finishing the setting, if the partial self-adaptability flag is set and time-out of partial self-adaptability is not reached, perform partial self-adaptability; if the partial self-adaptability flag is not set, perform complete self-adaptability;

or control initializing the device when the receiving module **701** receives a self-adaptability request, and detect whether the device is satisfied with a condition of entering the self-adaptability function entry upon finishing initialization, and in case that the device is satisfied with the condition, detect a self-adaptability failure flag, and in case that the self-adaptability failure flag is set, set variables and flags having been modified in process of self-adaptability to be initial values or initial status, prompt error and control shutting off the device; and in case that the self-adaptability failure flag is not set, detect a flag of precisely collecting, gray voltage, and in case the flag of precisely collecting gray voltage is set and time-out of precisely collecting gray voltage is not reached, precisely collect gray voltage; in case that the flag, of precisely collecting gray voltage is not set, detect a partial self-adaptability flag, in case the partial self adaptability flag is set and the time-out of partial self-adaptability is reached, reset the partial self-adaptability flag and perform complete self-adaptability upon completing the setting; in case the partial self-adaptability flag is set and the time-out of part-adaptability is not reached, perform the partial self-adaptability; in case that the partial self-adaptability flag is not set, perform complete self-adaptability.

The optical module **703** is configured to collect optical signal.

The load module **704** is configured to provide load for the optical module **703** and switch the load resistor under the control of the controlling module **702**.

The power module **705** is configured to supply power to the device.

Specifically, the controlling module **702** includes an initialization unit **702-1**, a detecting unit **702-2**, a optical controlling unit **702-3**, an AD unit **702-4**, a determining unit **702-5**, a computing unit **702-6**, a storing unit **702-7**, a load controlling unit **702-8**, a timing unit **702-9** and an oscillator unit **702-10**. The above units are of functions as below.

The initialization unit **702-1** is configured to control initializing the device after the receiving module **701** receives triggering information.

The detecting module **702-2** is configured to detect whether the device is satisfied with a condition of entering entry of self-adaptability function entry upon finishing initialization and check for a self-adaptability failure flag and a self-adaptability completion flag.

The determining unit **702-5** is configured to determine whether time-out of precisely collecting gray voltage is reached and time-out of partial self-adaptability is reached.

The storing unit **702-7** is configured to store all flags used in the process of self-adaptability.

The timing unit **702-9** is configured to set time-out of precisely collecting gray voltage and time-out of partial self-adaptability.

The oscillator unit **702-10** is configured to provide a reference clock for the device.

The optical controlling unit **702-3**, the AD unit **702-4**, the computing unit **702-6** and the load controlling unit **702-8** are configured to realize complete self-adaptability, partial self-adaptability and precisely collection of gray voltage.

The above-mentioned embodiments are only preferred embodiments of the invention and all common modifications and substitutions made by a technician skill in the art within the technical solution scope of the invention should fall below the scope of protection of the invention.

What is claimed is:

1. A method for improving luminous intensity adaptability of an optical signal collecting device, wherein the device controls a predetermined load resistor to conduct upon receiving a self-adaptability request, the device collects and sets a voltage upon being satisfied with a predetermined condition, and the load resistor has an influence on collecting of the voltage, the method comprising:

Step a, determining whether a self-adaptability is failed, if yes, restoring modifications on flags, variables and load resistors, prompting error and quitting; otherwise, collecting a voltage value and if the device stores a last collected voltage value, going to Step b; otherwise going to Step c;

Step b, comparing currently collected voltage value with the last collected voltage value, if difference between the currently collected voltage value and the last collected voltage value is smaller than a predetermined voltage value, going to Step c; otherwise replacing the last collected voltage value with the currently collected voltage value, clearing a voltage value buffer and going to Step c;

Step c, adding the currently collected voltage value to the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches a first predetermined voltage value, if yes, going to Step d; otherwise, quitting and waiting for next entering;

Step d, computing an average value of all voltage values stored in the voltage value buffer and determining whether a first voltage is reached, if yes, going to Step e; otherwise storing the computed average value as the first voltage and going to Step f;

Step e, comparing the computed average value with the first voltage stored in the device, if difference between the computed average value and the first voltage is smaller than a second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to Step f; if difference between the computed average value and the first voltage is not smaller than the second predetermined voltage value and the first voltage is greater than the computed average value, setting the voltage according to a first predetermined rule and going to Step f; if difference between the computed average value and the first voltage is not smaller than the second predetermined voltage value and the computed average value is greater than the first voltage, setting the voltage according to a second predetermined rule and going to Step f;

Step f, determining whether the first voltage, a second voltage and a third voltage are all collected, if yes, going to Step g; otherwise, quitting and waiting for next entering;

Step g, determining whether the first voltage, the second voltage and the third voltage stored in the device are all satisfied with a predetermined requirement, if yes, quitting and the device waiting for receiving data; otherwise going to Step h; and

Step h, determining whether a predetermined condition of switching resistor is satisfied, if yes, checking for status of a current load resistor, switching into a next load resistor according to a third predetermined rule, quitting and waiting for next entering and collecting voltage according to the next load resistor; otherwise, the self-adaptability being failed, clearing the first voltage, the second voltage and the third voltage stored in the device and quitting; wherein the predetermined condition of switching resistor is that times of switching resistor does not reach the second predetermined voltage value.

2. The method of claim **1**, wherein the device stores the first voltage, the second voltage and the third voltage in a high-to-low voltage value order of , the third voltage, the second voltage and the first voltage, correspondingly,

the setting voltage according to a first predetermined rule comprises:

(1) determining whether the second voltage is collected, if yes, going to (2); otherwise replacing the first voltage stored in the device with the computed average value, storing the first voltage stored in the device as the second voltage and going to Step f; and

(2) determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the second voltage stored in the device and replacing the second voltage stored in the device with the first voltage stored in the device and replacing the first voltage stored in the device with the computed average value and going to Step f;

otherwise, storing the second voltage stored in the device as the third voltage and replacing the second voltage stored in the device with the first voltage stored in the device and replacing the first voltage stored in the device with the computed average value and going to Step f;

the setting voltage according to a second predetermined rule comprises:

(1) determining whether the second voltage is collected, if yes, going to (2); otherwise, storing the computed average value as the second voltage and going to Step f;

(2) comparing the computed average value with the second voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the second voltage stored in the device with the computed average value and going to Step f; if difference between the two values is not smaller than the second predetermined voltage value and the second voltage value stored in the device is greater, going to (3) subsequently; and if difference between the two values is not smaller than the second predetermined voltage value and the computed average value is greater, going to (4);

(3) determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the second voltage stored in the device and replacing the second voltage stored in the device with the computed average value and going to Step f; otherwise, storing the second voltage stored in the device as the third voltage and replacing the second voltage stored in the device with the computed average value and going to Step f; and

(4) determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the computed average value and going to Step f; otherwise, storing the computed average value as the third voltage and going to Step f;

and the predetermined requirement is that both difference between the third voltage stored in the device and the second voltage stored in the device and difference between the second voltage stored in the device and the first voltage stored in the device are greater than a third predetermined voltage value.

3. The method of claim **1**, wherein the device stores the first voltage, the second voltage and the third voltage in a high-to-low voltage value order of, the third voltage, the first voltage and the second voltage, correspondingly,

the setting voltage according to a first predetermined rule comprises:

(1) determining whether the second voltage is collected, if yes, going to (2); otherwise, storing the computed average value as the second voltage and going to Step f;

(2) comparing the computed average value with the second voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the second voltage stored in the device with the computed average value and going to Step f; if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, going to (3) subsequently; if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, going to (4);

(3) determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the first voltage stored in the device and replacing the first voltage stored in the device with the second voltage stored in the device and replacing the second voltage stored in the device with the computed average value and going to Step f; otherwise, storing the first voltage stored in the device as the third voltage and replacing the first voltage stored in the device with the second voltage stored in the device and replacing the second voltage stored in the device with the computed average value and going to Step f; and

(4) determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the first voltage stored in the device and replacing the first voltage stored in the device with the computed average value and going to Step f; otherwise, storing the first voltage stored in the device as the third voltage and replacing the first voltage stored in the device with the computed average value and going to Step f;

the setting voltage according to a second predetermined rule comprises:

(1) determining whether the third voltage is collected, if yes, going to (2); otherwise storing the computed average value as the third voltage and going to Step f;

(2) comparing the computed average value with the third voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the third voltage stored in the device with the computed average value; if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, going to (3) subsequently; if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, going to (4);

(3) determining whether the second voltage is collected, if yes, replacing the second voltage stored in the device with the first voltage stored in the device and replacing the first voltage stored in the device with the computed average value and going to Step f; otherwise, storing the first voltage stored in the device as the second voltage and replacing the first voltage stored in the device with the computed average value and going to Step f; and

(4) determining whether the second voltage is collected, if yes, replacing the second voltage stored in the device with the first voltage stored in the device and replacing the first voltage stored in the device with the third voltage stored in the device and replacing the third voltage stored in the device with the computed average value and going to Step f; otherwise, storing the first voltage stored in the device as the second voltage and replacing the first voltage stored in the device with the third voltage stored in the device and replacing the third voltage stored in the device with the computed average value and going to Step f;

and the predetermined requirement is that both difference between the third voltage stored in the device and the first voltage stored in the device and difference between the first voltage stored in the device and the second voltage stored in the device are greater than a third predetermined voltage value.

4. The method of claim **1**, wherein the device stores the first voltage, the second voltage and the third voltage in a high-to-low voltage value order of the first voltage, the second voltage and the third voltage, correspondingly,

the setting voltage according to the first predetermined rule comprises:

(1) determining whether the second voltage is collected, if yes, going to (2); otherwise, storing the computed average value as the second voltage and going to Step f;

(2) comparing the computed average value with the second voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the second voltage stored in the device with the computed average value; if difference between the two values is not smaller than the second voltage value and the later is greater, going to (3) subsequently; if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, going to (4);

(3) determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the computed average value, going to Step f; otherwise, storing the computed average value as the third voltage and going to Step f; and

(4) determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the second voltage stored in the device and replacing the second voltage stored in the device with the computed average value and going to Step f; otherwise, storing the second voltage stored in the device as the third voltage and replacing the second voltage stored in the device with the computed average value and going to Step f;

the setting voltage according to a second predetermined rule comprises:

(1) determining whether the second voltage is collected, if yes, going to (2); otherwise, storing the first voltage stored in the device as the second voltage and replacing the first voltage stored in the device with the computed average value and going to Step f; and

(2) determining whether the third voltage is collected, if yes, replacing the third voltage stored in the device with the second voltage stored in the device, replacing the second voltage stored in the device with the first voltage stored in the device, replacing the first voltage stored in the device with the computed average value and going to Step f; otherwise, storing the second voltage stored in the device as the third voltage, replacing the second voltage stored in the device with the first voltage stored in the device, replacing the first voltage stored in the device with the computed average value and going to Step f;

and the predetermined requirement is that both difference between the first voltage stored in the device and the second voltage stored in the device and difference between the second voltage stored in the device and the third voltage stored in the device are greater than a third predetermined voltage value.

5. The method of claim **1**, wherein the device is configured with a partial self-adaptability flag and the partial self-adaptability flag is checked for in case of a successful self-adaptability;

if the partial self-adaptability is not set, the method comprises:

(1) collecting voltage value, if the device stores the last collected voltage value, going to (2); otherwise, going to (3);

(2) comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (3); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer, quitting and waiting for next entering;

(3) adding the currently collected voltage value to the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches the first predetermined value, if yes, going to (4); otherwise, quitting and waiting for next entering;

(4) computing the average value of all voltage values stored in the voltage value buffer and determining whether the first voltage is collected, if yes, going to (5); otherwise, storing the computed average value as the first voltage and going to (6);

(5) comparing the computed average value with the first voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, setting voltage according to the first predetermined rule and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, setting voltage according to the second predetermined rule and going to (6);

(6) determining whether the first voltage, the second voltage and the third voltage are all collected, if yes, going to (7); otherwise, quitting and waiting for next entering;

(7) determining whether the first voltage, the second voltage and the third voltage stored in the device are all satisfied with the predetermined requirement, if yes, setting the partial self-adaptability flag, setting a time-out of the partial self-adaptability, quitting and the device waiting for receiving data; otherwise, going to (8); wherein the predetermined requirement is that among the first voltage, the second voltage and the third voltage, difference between the middle-valued voltage and the smallest-valued voltage and difference between the largest-valued voltage and the middle-valued voltage are all greater than a third predetermined voltage value; and

(8) determining whether the predetermined resistor-switching condition is satisfied with, if yes, checking for status of the current load resistor, switching into the next load resistor according to the predetermined rule, quitting, waiting for next entering and collecting voltage according to the next load resistor; otherwise, the self-adaptability being failed, quitting; wherein the predetermined resistor switching condition is that times of switching the resistor does not reach the second predetermined value;

if the partial self-adaptability is set, the method comprises:

(1) determining whether time-out of the partial self-adaptability is exceeded, if yes, the self-adaptability being failed and quitting; otherwise, collecting voltage value, and if the device stores the last collected voltage value, going to (2); otherwise, going to (3);

(2) comparing the currently collected voltage value with the last connected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (3); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer and going to (3);

(3) adding the currently collected voltage value to the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches the third predetermined value, if yes, going to (4); otherwise, quitting and waiting for next entering;

(4) computing the average value of all voltage values stored in the voltage value buffer, comparing the computed average value with the first voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to (7); otherwise, going to (5);

(5) comparing the computed average value with the second voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the second voltage stored in the device with the computed average value and going to (7); otherwise, going to (6);

(6) comparing the computed average value with the third voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the third voltage stored in the device with the computed average value and going to (7); otherwise, discarding the computed average value, quitting and waiting for next entering;

(7) determining whether the first voltage, the second voltage and the third voltage are all collected, if yes, going to (8); otherwise, quitting and waiting for next entering;

(8) determining whether the first voltage, the second voltage and the third voltage stored in the device are all satisfied with the predetermined requirement, if yes, quitting and the device waiting for receiving data; otherwise, going to (9); wherein the predetermined requirement is that among the first voltage, second voltage and third voltage stored in the device, difference between the middle-valued voltage and the smallest-valued voltage and difference between the largest-valued voltage and the middle-valued voltage are both greater than a third predetermined voltage value; and

(9) determining whether the predetermined condition of switching resistor is satisfied with, if yes, checking for status of the current load resistor, switching into next load resistor according to the predetermined rule, quitting and waiting for next entering; otherwise, the self-adaptability being failed and quitting; in which the predetermined condition of switching resistor is that times of switching resistor does not reach a fourth predetermined value.

6. The method of claim **1**, wherein the device is configured with a flag of precisely collecting gray voltage, and if the self-adaptability is not failed, the method comprises checking for the flag of precisely collecting gray voltage;

if the flag of precisely collecting gray voltage is not set, the method comprises:

(1) collecting voltage value and if the device stores the last collected voltage value, going to (2); otherwise, going to (3);

(2) comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (3); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer and going to (3);

(3) storing the currently collected voltage value in the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches the first predetermined value, if yes, going to (4); otherwise, quitting and waiting for next entering;

(4) computing the average value of all voltage values stored in the voltage value buffer and determining whether the first voltage is collected, if yes, going to (5); otherwise, storing the computed average value as the first voltage and going to (6);

(5) comparing the computed average value with the first voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, setting voltage according to the first

predetermined rule and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, setting voltage according to the second predetermined rule and going to (6);

(6) determining whether the first voltage, the second voltage and the third voltage are all collected, if yes, going to (7); otherwise, quitting and waiting for next entering;

(7) determining whether the first voltage, the second voltage and the third voltage stored in the device are all satisfied with the predetermined requirement, if yes, setting the flag of precisely collecting gray voltage, setting time-out of precisely collecting gray voltage, quitting and waiting for next entering; otherwise, going to (8); wherein the predetermined requirement is that among the first voltage, second voltage and third voltage stored in the device, difference between the middle-valued voltage and the smallest-valued voltage and difference between the largest-valued voltage and the middle-valued voltage are both greater than a third predetermined voltage value; and

(8) determining whether the predetermined condition of switching resistor is satisfied with, if yes, checking for status of the current load resistor, switching into next load resistor according to the predetermined rule, quitting, waiting for next entering and collecting voltage according to the next load resistor; otherwise, the self-adaptability being failed and quitting; wherein the predetermined condition of switching resistor is that times of switching resistor does not reach the second predetermined value;

if the flag of precisely collecting gray voltage is set, the method comprises:

(1) determining whether time-out of precisely collecting gray voltage is reached, if yes, the self-adaptability being failed and quitting; otherwise, going to (2);

(2) collecting voltage value and determining whether difference between the currently collected voltage value and a predetermined voltage stored in the device is smaller than a fourth predetermined voltage value, if yes, going to (3); otherwise, quitting and waiting for next entering; wherein the predetermined voltage stored in the device is the middle-valued voltage among the first voltage, the second voltage and the third voltage stored in the device;

(3) if the device stores the last collected voltage value, going to (4); otherwise, going to (5);

(4) comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (5); otherwise, replacing the voltage value last collected by the device with the currently collected voltage value, clearing the voltage value buffer and going to (5);

(5) storing the currently collected voltage value in the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches a fifth predetermined value, if yes, going to (6); otherwise, quitting and waiting for next entering; and

(6) computing the average value of all voltage values stored in the voltage value buffer, replacing predetermined voltage stored in the device with the computed average value, resetting the flag of precisely collecting gray voltage and quitting, the device waiting for receiving data.

7. The method of claim **1**, wherein the device sets a partial self-adaptability flag and a flag of precisely collecting gray voltage and in case that the self-adaptability is not failed, the method comprises checking for the flag of precisely collecting gray voltage,

if the flag of precisely collecting gray voltage is set, the method comprises

(1) determining whether time-out of precisely collecting gray voltage is reached, if yes, the self-adaptability being failed and quitting; otherwise, going to (2);

(2) collecting voltage value and determining whether difference between the currently collected voltage value and the predetermined voltage stored in the device is smaller than a fourth predetermined voltage value, if yes, going to (3); otherwise, quitting and waiting for next entering, wherein the predetermined voltage stored in the device is a middle-value voltage among the first voltage, the second voltage and the third voltage stored in the device;

(3) if the device stores the last collected voltage value, going to (4); otherwise, going to (5);

(4) comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (5); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer and going to (5);

(5) storing the currently collected voltage value in the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches a fifth predetermined value, if yes, going to (6); otherwise, quitting and waiting for next entering; and

(6) computing the average value of all voltage values stored in the voltage value buffer, replacing the predetermined voltage stored in the device with the computed average value, resetting the flag of precisely collecting gray voltage and quitting, the device waiting for receiving data;

in case that the flag of precisely collecting gray voltage is not set, the method comprises checking for the part self-adaptability flag,

in case that the flag of precisely collecting gray voltage is set, the method comprises:

(1) determining whether time-out of the partial self-adaptability is reached, if yes, the self-adaptability being failed, quitting and waiting for next entering; otherwise, collecting voltage value and if the device stores the last collected voltage value, going to (2); otherwise, going to (3);

(2) comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (3); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer and going to (3);

(3) storing the currently collected voltage value in the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches the third predetermined value, if yes, going to (4); otherwise, quitting and waiting for next entering;

(4) computing the average value of all voltage values stored in the voltage value buffer, comparing the computed average value with the first voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the first voltage stored in the device with the computed average value and going to (7); otherwise, going to (5);

(5) comparing the computed average value with the second voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the second voltage stored in the device with the computed average value and going to (7); otherwise, going to (6);

(6) comparing the computed average value with the third voltage stored in the device, if difference between the two values is smaller than the second predetermined voltage value, replacing the third voltage stored in the device with the computed average value and going to (7); otherwise, discarding the computed average value, quitting and waiting for next entering;

(7) determining whether the first voltage, second voltage and third voltage is all collected, if yes, going to (8); otherwise, quitting and waiting for next entering;

(8) determining whether the first voltage, the second voltage and the third voltage stored in the device are all satisfied with the predetermined requirement, if yes, quitting and waiting for next entering; otherwise, going to (9); and

(9) determining whether the predetermined condition of switching resistor is satisfied with, if yes, checking for status of the current load resistor, switching into next load resistor according to the predetermined rule, quitting and waiting for next entering; otherwise, setting the self-adaptability failure flag and quitting; wherein the predetermined resistor switching condition is that times of switching resistor does not reach a fourth predetermined value;

in case that the part self-adaptability flag is not set, the method comprises:

(1) collecting voltage value and if the device stores the last collected voltage value, going to (2); otherwise, going to (3);

(2) comparing the currently collected voltage value with the last collected voltage value, if difference between the two values is smaller than the first predetermined voltage value, going to (3); otherwise, replacing the last collected voltage value with the currently collected voltage value, clearing the voltage value buffer, quitting and waiting for next entering;

(3) storing the currently collected voltage value in the voltage value buffer and determining whether number of voltage values stored in the voltage value buffer reaches the first predetermined value, if yes, going to (4); otherwise, quitting and waiting for next entering;

(4) computing the average value of all voltage values stored in the voltage value buffer and determining whether the first voltage is collected, if yes, going to (5); otherwise, storing the computed average value as the first voltage and going to (6);

(5) comparing the computed average value with the first voltage stored in the device and if difference between the two values is smaller than the second predetermined voltage value, replacing the first voltage value stored in the device with the computed average value and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the later is greater, setting voltage according to the first predetermined rule and going to (6); if difference between the two values is not smaller than the second predetermined voltage value and the former is greater, setting voltage according to the second predetermined rule and going to (6);

(6) determining whether the first voltage, the second voltage and the third voltage are all collected, if yes, going to (7); otherwise, quitting and waiting for next entering;

(7) determining whether the first voltage, the second voltage and the third voltage are all satisfied with the predetermined requirement, if yes, setting the partial self-adaptability flag and the flag of precisely collecting gray voltage, setting the time-out of the part self-adaptability and the time-out of the precisely collecting gray voltage and quitting, the device waiting for receiving data; otherwise, going to (8); wherein the predetermined requirement is that among the first voltage, second voltage and third voltage, difference between the middle-valued voltage and the smallest-valued voltage and difference between the largest-valued voltage and the middle-valued voltage is both greater than a third predetermined voltage value; and

(8) determining whether the predetermined condition of switching resistor is satisfied, if yes, checking for status of the current load resistor, switching into next load resistor according to the predetermined rule, quitting and waiting for next entering and collecting voltage according to the next load resistor; otherwise, the self-adaptability being failed and quitting; wherein the predetermined condition of switching resistor is that times of switching resistor does not reach the second predetermined value.

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